READING BY TOUCH

by
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Early Systems of Touch Reading

It is recorded that a distinguished blind Arab professor, Zain-Din al Amidi, of the Univeristy of Moustansiryeh, in what is now Iraq, in the fourteenth century improvised a method by which he identified his books and made notes. Although blind soon after birth, he led a studious life, interesting himself particularly in jurisprudence and foreign languages. In 1517 one Francisco Lucas of Saragossa contrived a set of letters carved on thin tablets of wood, which was brought to Italy about 1575 and improved by Rampansetto of Rome, who used larger blocks, engraving the letters instead of embossing them. Both systems failed because the letters were too difficult to read. In 1547 an Italian physician, Girolamo Cardano, suggested a method of teaching the blind to read which in some ways resembled the work of Louis Braille. In 1640 Pierre Moreau, a Paris notary, cast a movable lead type, but abandoned his invention because of lack of means. At the same time, letters made of tin were used by Schonberger, of Konigsberg. In 1651 George Harsdorffer, a Nuremburg poet, revived the classical method of a wax-coated tablet in which letters could be cut with a stylus. In 1676 an Italian Jesuit, Francisco Terzi, devised a kind of cipher code based on a system of dots enclosed in squares and other shapes. He also advocated a type of string alphabet, a system said to have originated in various parts of South America. Its adoption in this country is credited to two blind Edinburgh men, Robert Milne and David McBeath. Seven main knots, of varying construction, were used to represent certain letters, and the remaining letters of the alphabet used these knots in combination with a smaller knot set a varying distance from the main knot. A string alphabet was used for many years at the Glasgow Asylum for the Blind, and passages from the Bible were translated into this medium, the string being drawn from a reel by the reader. This system was also used by blind people to correspond with each other and with their sighted friends.

The French encyclopedist, Diderot, tells of a blind woman born in 1741 who had been taught to read from letters cut out of paper. A Viennese musician, Maria Theresa von Paradis, born in 1759 and blind from early childhood, learned to read by means of pins stuck into a cushion in the shape of letters. She subsequently was able to read a system of letters pricked through cardboard, invented by a blind man called Weissenberg of Mannheim, and even had a press invented for her by von Kempellen with which she printed German characters in relief.

Hauy

The great pioneer, however, in the education of the blind was the Frenchman Valentin Hauy who founded at Paris in 1784 the first of all schools for the blind. His main concern, of course, was to discover a way of teaching his pupils to read. Maria von Paradis herself visited Paris and explained Weissenberg's system to Hauy. But Hauy conceived the idea that the blind could be taught to read by means of ordinary large type printed in relief. Although Hauy was not the first to discover the art of embossed printing, he was the first to use it in the production of books for the blind. For more than forty years the pupils of the school founded by Hauy acquired their education from his large, relief-printed folios, a very slow and cumbersome process. Writing, of course, was even more cumbersome, for the only way in which the pupils could express themselves was by setting up letters in type. In 1786 Hauy published his *Essai sur l'Education des Aveugles*, which described his aims and methods, and an English translation of this was published by Thomas Blacklock, the blind Scottish poet, in 1793. Hauy used the italic form of the roman letter in two sizes of type, the larger for beginners and the smaller for experienced readers. The pages were printed on one side only, and were pasted back to back before binding. He developed several abbreviations and contractions to reduce the size of his books.

The Genesis of Braille

In 1821 Hauy's school, the Institution Nationale des Jeunes Aveugles, was visited by an ex-captain of artillery, Charles Barbier, who in 1819 had invented a system of writing by dots based on phonetic principles: this he had evolved from a form of what he called "night writing", which he claimed would enable soldiers in the field to communicate with each other during darkness. Barbier's system, though too intricate for general use, interested some of the pupils of the Institution Nationale because it could be read more rapidly than Hauy's embossed roman letter, and, more important, it could be written by means of a stylus and a metal frame devised by Barbier. But it was not satisfactory, and its importance lies in the fact that it provided the idea on which Braille based his own system.

Meantime, experiments continued in other countries. A type of roman capital formed of raised dots and dashes was invented by Koechlin of Stuttgart. Klein in Vienna produced a vertical arrangement of five embossed points.

The first embossed books for the blind to be used in this country were some of Hauy's works imported in 1821 by Lady Elizabeth Lowther for her blind son, later to become Sir Charles Lowther, who in 1832 obtained type from Paris and embossed parts of the Bible for his own use.

Gall's Type

Hauy's books in 1826 so impressed James Gall, an Edinburgh printer and publisher, that he immediately started to experiment on his own account. In 1827 he published his *First Book for Teaching the Art of Reading to the Blind*, partly in inkprint and partly in his own embossed type. This was followed by other books. His alphabet was an angular modification of roman capitals, first engraved in wood and later cast in metal. He subsequently realized that dots were more easily deciphered by the fingers than unbroken lines and so developed a form of serrated type. He published, without financial help, several embossed books for the British and Foreign Bible Society, the London Sunday School Union, and the Religious Tract Society.

Fry and Alston

In 1832 the Edinburgh Society of Arts offered a gold medal for the best method of printing for the blind. No fewer than nineteen systems were submitted, sixteen of them using arbitrary symbols. The medal was ultimately awarded to Dr. Edmund Fry, of London, for a plain roman letter which, slightly modified later, became very popular in this country and America. Fry's type was adopted with some modification, by John Alston, of the Glasgow Asylum for the Blind, who established a printing press, and published, *inter alia* first the New Testament and then, in 1840, the complete Bible, in nineteen volumes, the first embossed Bible of any type. The books he published sold widely, here and in America. His types were cut in very sharp, thin faces in two sizes, Great Primer for ordinary use and Double Pica for learners and older readers whose fingers were insufficiently sensitive to cope with the smaller type.

Boston Line Letter

During Alston's time, the pioneer of embossed printing in the United States, Dr. Samuel Howe, the first director of the Perkins Institution in Boston, toured Europe inspecting all the methods of embossed printing he could find, and finally decided on a variation of the Alston system consisting of small angular letters without capitals. This became known as Boston Line Letter and, with the later addition of capitals, was widely used in the United States.

The very prolixity of these systems based on the roman alphabet shows that none was satisfactory: all in fact were very difficult to master.

Shorthand Systems

Systems based on shorthand were also tried, notably those of Lucas and Frere. Lucas, a shorthand writer of Bristol, used straight and hooked lines, curves and dots, the meanings of many signs, as in shorthand, being dependent on their position on the line. Books printed in this system were widely used, both in this country and abroad, and a musical notation was developed from it. Frere, a Londoner who was himself blind, invented a system based on phonetic principles, the characters of which consisted of straight and hooked lines, angles and half circles, as well as hollow and solid circles. To speed reading, he bracketed two lines of type together, the second line of each bracket being reversed and read from right to left. No punctuation marks were used. Frere was also responsible for a method of printing his

books, and this was used by others: copper characters were placed on a tin plate coated with zinc solution, and heat was applied to the bottom of the plate, resulting in the fusion of the characters to the plate and a consequent very sharp imprint. The difficulties of learing both the shorthand systems, however, were just as great as in the earlier "line" systems, although the books produced thereby were cheaper and less bulky.

Moon

The only line system now surviving, indeed flourishing, was that invented in 1847 by Dr. William Moon, of Brighton. Moon, after a partially sighted childhood, became blind at the age of 21 and soon mastered all the systems of embossed writing available to him: he found from experience that very few blind people were capable of using them satisfactorily and decided to produce a system of his own. This retained many roman letters in simplified form, the remaining letters being based on Frere's linear characters, without signifying the same letters. His alphabet consisted of only nine characters, their signification being determined by which way up they were used. He also, like Frere, bracketed his lines for ease of reading, but unlike Frere's return line, the letters in his were not reversed. He also reduced contractions to a minimum. He had early resolved to make the welfare of the blind his life's work, being deeply religious and a man of simple evangelical faith. At first he earned his living by teaching blind pupils to read, using Frere's system. He had married young, and his wife kept a shop to augment his earnings from teaching, five shillings a week at first. He records that soon after the birth of his second child "my landlord came and told me that he must raise my rent 6d per week. I told him that I would lay it before the Lord, beseeching Him to aid me in these trying circumstances. The following week, before the additional rent became due, an extra half-crown was added to my salary, which made ten shillings a week." He soon found that most of his pupils were unable to decipher the characters or to memorize a series of contractions, and so began to devise his own system. By this, he wrote in his diary, "a lad who had in vain for five years endeavoured to learn to read by the other systems could in ten days read easy sentences." In 1847 he issued his first booklet, printed on a wooden hand press in his house, and soon after began to undertake the printing of parts of the Bible. This led him to evolve a stereotyped plate from which copies could be printed whenever required: a plate of tinned sheet iron on which the characters of tinned copper wire, cut and shaped by special tools, were fixed. The first wooden press was eventually replaced by an iron Albion. The strong evangelical tenor of Moon's life led to much work for missionary societies, the Moon system being adapted to other languages. By 1880 the alphabets of 194 foreign languages were available for the use of missionaries, although now Moon is largely confined to this country. Between 1847 and 1880 he stereotyped 30,000 plates and produced nearly 125,000 volumes.

From 1923, Moon has been printed direct from type. Several of the types are square bodied, so that four characters can be produced, depending upon which way up the type is used, from one piece of type; others, on square or narrower bodies, make two characters; and some only one. Fourteen types are required to make the Alphabet, and twelve other types are used for contractions and punctuation marks. There are six sizes of space, which are higher than those used for inkprint, since they must be as high as the shoulder of the type on which the letter is cast to ensure perfect embossing. The type is set by hand directly

into the chase, and between each line a thin brass rule is used. There are about 900 letters and spaces in a Moon page measuring 12 by 10 in., and these can be set by an experienced typesetter in half an hour. The forme weighs 50 lb. The paper is moistened before printing to take the embossing without splitting, and after printing the pages pass through a mechanical gas-heated drier.

What became the Moon Society has since 1914 been managed by the (now) Royal National Institute for the Blind, and provides a useful and complementary service to Braille publishing, offering a clear, bold type for older people whose touch is not good enough for reading Braille.

Braille

It was Louis Braille who made the great breakthrough. In his time there were in existence over twenty different systems of embossed type, most of which had been invented by those who could see, and none of which proved as easy to the touch as to the sight. Limited in value though these systems were for reading, perhaps their most important drawback was their virtual uselessness in providing a means whereby the blind could themselves write: the education of the blind in literature and music had to be largely oral. In other words, two-way literary communication was impossible for blind people. The beauty of Braille's system was its simplicity, and its major advantage over everything that had gone before was that it could be simply and easily written by the blind. It was a practical script, invented and perfected by a blind man.

Louis Braille was born near Paris in 1809, the son of a cobbler, and lost his sight in early childhood as a result of an accident with one of his father's tools. He later entered Hauy's school and learnt to read Hauy's alphabet. He proved to be a first-class student, and subsequently joined the staff of the school. He studied Barbier's system, looking for a means whereby it could be adapted for both reading and writing and also for musical notation (he himself was a good musician and played the organ at several Paris churches). By 1825, at the age of 16, his system was more or less complete. The results of his experiments he summarized in a pamphlet issued in 1829. These results did not wholly satisfy him, however, and he worked on them for a number of years until in 1834 he produced an improved version of his scheme. This was more compact than any system which preceded or followed it.

Braille consists of sixty-three symbols, out of a possible sixty-four variations of the dots of a domino six (the sixty- fourth being the blank). These dots are, for purposes of description, numbered 1-2-3 downwards in the left hand column and 4-5-6 downwards in the right hand column. Letter A is dot 1, B dots 1 and 2, C dots 1 and 4, and so on. The first ten letters are formed from the top four dots, the second ten consist of the first ten repeated with the addition of dot 3, and a similar symmetry continues the division of the sixty-three symbols until seven groups of symbols are formed. In English Braille the alphabet takes twenty-six of the characters, punctuation ten, and the remaining twenty-seven are used to meet the special needs of individual languages or for contractions. Numbers are represented by the first ten letters preceded by a numeral sign. In a number of

languages there are two grades of Braille, Grade 1, in which every word is fully spelt, letter by letter, and Grade 2 (the everyday form), in which various contractions are used to express prefixes, suffixes, pronouns, conjunctions, prepositions, and other frequently recurring groups of letters and words, the main purpose of these being the reduction of bulk. A few languages have a Grade 3, highly abridged, which comes close to shorthand, but Grade 3 is too complex for all but a small minority of readers who have a good command of language and a good memory. Sensitivity of touch, of course, governs the extent to which Braille is used: those educated in schools for the blind use Braille far more naturally and easily than those who lose their sight in adult life and are almost invariably slow readers. The older people are, the more difficult it is for them to acquire the sensitivity of touch necessary for ease of reading. Commercial Braille shorthands are widely used, for shorthand-typing is one of the more established occupations for the blind. From the beginning, Braille has been used for musical notation. It is also applied to the expression of scientific and mathematical symbols and formulae, the marking of instruments and equipment (watches, thermometers, gauges, playing cards, etc.) and to the outlining of maps and diagrams.

Despite its manifest advantages, the chief of which were its adaptability for writing and for rapid reading, its ability to express music as well as words, and its simplicity, Braille's system was slow to be adopted, especially outside France.

Braille in the United Kingdom

Dr. Thomas Rhodes Armitage, an able blind man, who is generally held to have introduced Braille to this country, expressed in his book THE EDUCATION AND EMPLOYMENT OF THE BLIND written in 1886, the following view of the bitter controversies which have been waged over types for the blind as late as the 1860s and 1870s:

The two main causes of this lamentable state of things seem to be that inventors of systems and managers of institutions generally had their sight and, misled by this sense, they could not understand or enter into the real wants of the blind. It is a curious and instructive fact that the two systems which are now most in favour with the blind themselves, and which have most vitality in them, are due to two blind men, Mr. Braille and Dr. Moon. . . . Among the more intelligent of the blind the opinion has long been gaining ground that for any good results to be obtained, the question must not be settled for *the blind, but* by *the blind themselves. . . . The relative merits of the various methods of education through the sense of touch should be decided by those and those only who have to rely upon this sense.*

This policy he had put into effect in 1868 when, with other intelligent and educated blind men, he had made an exhaustive study of all the available systems, and had decided that the blind would best be served by an acceptance of the Braille system *in toto* which he considered undoubtedly superior to all others. Armitage's committee became the British & Foreign Blind Association, later the National Institute for the Blind, and was in its early days solely a Braille publishing house. Under its leadership, Braille quickly became the educational medium of the British blind.

Braille in America

In the United States, however, the adoption of the French system took longer. By some the French arrangement was adopted, by others a modified form of the French system in which the most frequent letters were given the fewest dots, by others still a more radical change which involved making the Braille domino horizontal instead of vertical. All three systems had their advantages: the first achieved uniformity with Great Britain and most European countries; the second (American Braille) economy of dots, which made writing by hand easier; the third (New York Point) reduced space and made reading speedier. The disaster was having three entirely different scripts in English, indeed, within one country: school books, Bibles and the like had to be printed in three types, at great expense, and blind people brought up on different systems could not communicate. The futility of the situation lasted for thirty or forty years, and only in 1918, after much committee work, was unity achieved between Europe and the United States by the adoption of the original French system. But it was not until 1932 that agreement between the United Kingdom and the United States established Standard English Braille as the contracted form for everyday use throughout the English-speaking world.

Braille in Non-European Languages

After the adoption of the Braille system by European countries, the first adaptation of Braille to non-European languages began to appear in the 1870s. The UNESCO Report on World Braille Usage notes an Arabic Braille in 1878 and a Peking Braille at about the same time. Palamcottah or Askwith Braille for Tamil (South India) and Shirreff Braille for Urdu and Hindi (North India) were designed in the 1890s. Marathi Braille (Poona), Nilkantrai Braille for Marathai, Gujarati and Hindi (West India), Oriental Braille (for all oriental languages) and Shah Braille (Bengal) came into being about the turn of the century. At the same time, independent mission workers in China were creating further adaptations for the Chinese. A Japanese adaptation had been made in 1887, and other languages followed rapidly–among them Sinhalese, Burmese, Korean, Persian, Armenian and Turkish. Many lesser known tongues, too, some even without visual scripts, were adapted to Braille. Most of the credit for pioneering braille in Asia, Africa and the remote places of the earth belongs to the missionary bodies of Europe and America, the UNESCO Report emphasizes. Working in their distant outposts, they took pity on helpless blind children and gathering them into missionary compounds, discovered almost without realizing it that they had founded pioneer schools for the blind. Adaptation of Braille to the local vernaculars had to be made before systematic education could begin, and these they designed as best they could.

Uniformity

As the UNESCO Report points out, the 120 years between the publication of Braille's system in 1829 and the request to UNESCO in 1949 to lend its services to rationalize Braille usage in many parts of the world divide readily into two main phases. The first fifty years was that of the diehard retreat of the cumbersome old forms of embossing which the blind could not write, then seventy years throughout which the original Braille had to compete with many reconstructed forms of itself. The defeat of the old embossings was inevitable, and the civil war between the numerous adaptations of Braille was probably equally inevitable. The divergencies embodied theoretical improvements which had to be tried

before their authors realized that local advantages were outweighed by wider considerations.

It is perhaps difficult for a sighted person to realize that, with the great variety of scripts used throughout the world to record the spoken word, the blind, whether their language is Chinese, or Tamil, or English, have only one sript, and that is Braille. In this light, therefore, it is of great importance that a high degree of uniformity in usage be adopted. To this end, the World Braille Council was established in 1951 under the auspices of UNESCO, in 1954 coming under the aegis of the World Council for the Welfare of the Blind, and in the last decade much progress has been made, and is still being made, towards achieving a standard world Braille usage.

Braille Printing

In Europe and America the general adoption of Braille was followed by the setting up of Braille printing presses and large Braille libraries. These stimulated the rapid growth of education for the blind, which in turn, led to a greater demand for books. Except in Japan, practically no machine-printing of Braille has until recently been done in non-European languages.

Braille books are produced in two ways, by hand-copying or by machine-printing. Hand-transcribed books are, in this country, written mainly by voluntary transcribers on Braille writers. The Braille writer was invented by an American, Hall, in 1892, and is a small portable machine with six keys, one for each Braille dot, which serves roughly the same purpose as a typewriter. It enables Braille to be written far more quickly than with a single stylus and writing frame. After the manilla sheets have been transcribed, they are proof-read, guarded, sewn into section, and bound into covers. In the early days of Braille, all embossed books had to be produced by hand, a long and laborious business–a situation comparable to that existing before the invention of movable type. Platen presses were, however, adapted to Braille printing, but on the transcribing side, the British and Foreign Blind Association for many years used brass plates embossed by hand with a punch and hammer. The first edition of the Bible in English Braille was produced this way between 1877 and 1890: every single dot of the 20,000,000 on the 6,000 sheets was the work of one blind man. The advent of stereotyping (also invented by the American, Hall), which was adopted by the British and Foreign Blind Association in 1902, improved matters considerably. The transcribing machines were much larger and heavier versions of the Braille writer, embossing not on manilla paper but on zinc sheets. These transcribing machines were by 1911 electrically operated, and by 1930 the National Institute for the Blind (as it then was) had acquired a high-speed rotary press for printing. While these technical developments vastly speeded up the process of Braille publishing, it remained, compared with letter press, a very slow and costly business.

Solid Dot Braille

In effect, ever since Braille invented his system, there has been no substantial change in the method by which it has been printed. Traditonally, Braille has been produced on stout paper by distorting the fibres of the paper to form hollow dots. This method, however, has always had two great disadvantages: the first, its great bulk compared with inkprint, and the

second its lack of durability, or capacity to withstand repeated reading and handling in transit while still remaining legible. The bulk of Braille, and the consequent storage problem, precludes personal Braille libraries of any size, thus compelling the blind reader to rely to a far greater extent that the sighted upon lending libraries for his reading. And, of course, Braille books in constant circulation are more liable to damage than inkprint books, while beginners in Braille, both children and newly-blind adults, are prone to treat a book pretty severely until their fingers become practised and light of touch. Any system, therefore, which can substantially reduce the physical dimensions of books for the blind and improve their durability is vitally important.

The Braille publishers in the United Kingdom, the Royal National Institute for the Blind and the Scottish Braille Press (the latter operating on a smaller scale than the RNIB and producing for the most part periodical literature), are faced with the massive task of trying to provide as best they can a service which sighted readers get from hundreds of publishing houses offering great variety and specializing, many of them, to a greater or lesser extent in certain categories of book. But however small the proportion of blind people in the whole population, and however small the proportion of Braillists in the blind population, their reading requirements, educational, professional, and recreational, are as broad as those of letterpress readers. The need for expansion in Braille publishing has, therefore, always been apparent, and any method of increasing the speed (and thereby the quantity) of Braille production and of reducing the cost will contribute towards closing the enormous gap which exists between what is available to the sighted reader and what is available to the blind. The quest for a more permanent Braille goes back at least forty years: the idea of somehow depositing dots on paper rather than of perforating paper is by no means new. But it has been only comparatively recently that technical advances, particularly in the field of plastics, have made possible the development of a practical and economic process.

After many years of trial and error, the RNIB has evolved a method of depositing and heat-sealing solid dots of plastic on to the surface of a thin but strong paper, and based on this method a complete processing plant has been designed. This is the new system of printing Braille which has become widely known as "solid dot". The bulk of solid dot Braille is reduced by something like 45 percent; the dots themselves are uncrushable and do not deteriorate with use; and the system, although more costly to install than the conventional embossing plant of similar output, is quicker and less expensive to operate.

Since 1959 an increasing number of the RNIB's periodicals have been produced by the solid dot method, and a considerable volume of support for solid dot has led to the decision by the RNIB to adopt the process for most of its machine-printed Braille (the production of hand-transcribed books, of course, is in no way affected by solid dot). With the general acceptance of solid dot Braille and its employment for book production as well as for magazines, the way is clear for a further step forward by the blind, through the medium of the written word, towards equality of opportunity with the sighted.

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AMERICAN FOUNDATION FOR THE BLIND
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(212) 620-2051

Reference List of Companies Providing Computer-Related Access Products for Blind and Visually Impaired Persons

Revised: December 13, 1989

AI Squared
1463 Hearst Drive
Atlanta, GA 30319
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ZoomText: Large print screen access software for IBM PCs/compatibles and PS/2, Models 30 & 50-80; requires either EGA or VGA adapter/monitor.

Access-Ability Systems
P. O. Box 97
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(708) 251-5787

64-Reader: Synthetic speech screen access for the Commodore 64 computer.

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(800) 461-0006 (in Texas)

Apple Computer Resources for the Handicapped: Free guide on synthetic speech and large print hardware/software; variety of educational software; all for Apple II or Macintosh computers.

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Norwegian, Danish, German, French, Italian & Spanish (interface card from Innovox in Sweden); for IBM PCs/compatibles. Talk Plus: Synthetic speech screen access software for use with ReadMe; for IBM PCs/compatibles.

Ady, Donald W.
56 Oak Ridge Avenue
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(201) 277-3365

Low Vision Editor: Large print word processor for the Tandy TRS-80 computers, Models 1, 3 or 4.

AICOM Corporation
2375 Zanker Road, Suite 205
San Jose, CA 95131
(408) 922-0855

Accent: Speech synthesizers; Model 1200 for Toshiba T-1200 or T-1600 laptops; Model PC for IBM PC XT or AT/compatibles internal slot; Model SA for connection to an RS232c serial port; works with most screen access software.

American Printing House for the Blind (APH)
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Echo Commander: Synthesizer accessory. Echo Textalker 3.1.3: Synthetic speech screen access software. Sensible Speller (APH version): Spell checker. TALK (Talking Apple Literacy Kit): Tutorial for beginning computer users. Talking Typer, Speaking Speller, Elementary Math (Vol 1), Talking Games (Vol 1): Educational software. Some MECC and SEI educational software; all above for Apple IIe and/or IIgs computers with Echo synthesizers. 11.5x11 inch braille computer paper. PocketBraille: Notetaker with braille keyboard and synthetic speech output; connects to most RS232c devices. Speaqualizer: Synthetic speech screen access hardware/software; for IBM PCs/compatibles. Some Apple, Echo & programming manuals in braille and/or large print.

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ATC/Resus 214: Braille embosser; operates at 140 cps. Braillo 60, 90, 200 & 4000: Braille embossers; operate at 60, 90, 167 & 417 cps with either 6-or 8-dot cells. Ohtsuki BT-5000 Printer: Braille embosser; able to print alternate lines of braille and ink-print, braille only or print only. Above embossers connect to most computers. Compu-Dot: Braille computer paper in either 100-pound tag (Final Edit) or 60-pound kraft (Rough Draft); including 8.5X11 or 11X11.5 inches.

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Text Writer: Word processor. Utility Talk: Disk information manager/programming tools. Trivia Talk, Fortune Talk, Password Talk: Games and puzzles. All are synthetic speech software for an Apple computer with an Echo synthesizer.

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Santa Clara, CA 95054
408/727-3434

ARKENSTONE READER: OCR hardware/software converts print into computer-based text file for access through synthetic speech, large print or braille; requires IBM-style AT 286 or 386 PC or PS/2 Models 50-80 plus scanner; supports 8 scanner brands, 32 word processors, spreadsheets and desk-top publishing formats.

Artic Technologies
55 Park Street
Suite 2
Troy, MI 48083-2753
(313) 588-7370

Artic Vision, Business Vision: Synthetic speech screen access software for use with Artic series of synthesizers. Crystal, D'Light & SynPhonix synthesizers for IBM PCs/compatibles, NEC Multispeed & Toshiba laptops. Turbo-Pedal: Foot pedal for use with several of above synthesizers. Sonix-2: Software permits use of non-Artic synthetic speech products to work with the SynPhonix 215 synthesizer. SynPhonix 210: Upgrade of 200 model operates at all PC clock speeds; bundled with Sonix-2. SynPhonix

MC315: Micro channel synthesizer for IBM PS/2 Models 50-80 computers. Encore: Pop-up utility includes banking/checking, note taker, card index, phone directory, calendar, alarm/timer, date reminder, video capture to disk; for use with Artic Vision or Business Vision.

Arts Computer Products, Inc.
145 Tremont St., Suite 407
Boston, MA 02111
(617) 482-8248

Duran Dots: Braille embossing adaptor for Brother HR-20/40 printers. PC Braille: Braille translation software. PC Sift, WP Sift: pre-translation software helps correctly format documents prior to use of PC Braille. Above for all IBM/compatibles. PC Lens: Large print screen access software. For IBM PCs/compatibles.

Assembly Corner
P.O. Box 151
Maynard, MA 01754
(508) 897-7749

TexTalk: Word processor with large print and synthetic speech for Apple Macintosh, also supports Apple Imagewriter and Laserwriter.

Associated Services for the Blind
919 Walnut Street
Philadelphia, PA 19107
(215) 627-0600

Manuals: Variety of PC and other product manuals in braille. ASB also has equipment subsidy fudn to assist in purchase of assistive technology.

Automated Functions, Inc.
6424 N. 28th Street
Arlington, VA 22207
(703) 536-7741

Lap Talker: Toshiba T-1000 laptop computer with synthetic speech screen access. GEM: Self-contained synthetic speech/audible tone computer for games and educational software; separate cartridges available such as Tug of War, Sub Hunt, Bowling, Monster Shoot, Casino, States and Capitals, Math Tutor, Speller Tutor.

Bainum Dunbar, Inc.
P.O. Box 742028
Houston, TX 77274-2028
(713) 988-0887

Brainz-Builder One: Educational software with synthetic speech (Echo) prompts and large print. For Apple II computers.

Bayman, Benjamin F.
3611 Abbott Avenue, South
Minneapolis, MN 55410
(No telephone listed)
Large Print Word Processor Program: For the Commodore 64, 64C and 128 computers.

Beagle Brothers
3990 Old Town Avenue, Suite 102C
San Diego, CA 92110
(800) 345-1750
(800) 992-4022 (in California)
Prontos DOS Utility Program: Triples the speed of DOS 3.3 programs for Apple II computers.

Berkeley System Design
1708 Shattuck Avenue
Berkeley, CA 94709-1720
(415) 540-5535
inLARGE: Large print screen access software. inTOUCH: Tactile screen access in combination with TSI's Optacon II. outSPOKEN: Synthetic speech screen access software. Above for Apple Macintosh 512KE/SE & Plus computers.

Blazie Engineering
3660 Mill Green Road
Street, MD 21154
(301) 879-4944
Braille Blazer: Braille embosser, 15cps, 6- or 8-dot braille; graphics capability; RS232c and parallel ports, six pounds, uses 8.5-11 inch tractor-feed paper; also contains built-in speech synthesizer for setting parameters or to connect to a PC. Thiel Beta X3: Braille embosser, 120 cps, RS232c serial port. Braille 'n Speak: Braille keyboard input and synthetic speech output, self-contained pocket-sized notetaker & clock/calendar with built-in Grade 2 braille reverse translator; connects to RS232 devices. Personal Touch: 20-cell refreshable braille input/output notetaker; optional software permits use as an IBM PC/compatible terminal; battery-operated (20 hours per AAA batteriesset). SpeakSys: Software interface permits use of Braille 'n Speak and IBM PC/compatible; PC keyboard can be used with either Grade 2 or computer braille input.

BOBCAT Computer Applications
5200 W. 68
Shawnee Mission, KS 66208
(913) 262-7440
TABICAT: Braille transcription software for use with the Commodore 64. BOBCAT: Training program for TABICAT. Bobcat with Voice: same as above but with synthetic speech via a software synthesizer.

Borland International
Att: Jeanina Martin, Customer Service
1700 Green Hills Road
Scotts Valley, CA 95066
(408) 438-8400
Manuals: on disk, free to visually impaired users.

Boston Educational Computing, Inc.
Dept. R
78 Darthmouth Street
Boston, MA 02116
(617) 536-5116
Add/Sub, A B Choo Choo, Fruit Tree and Shape Games: Variety of educational software with large print/graphics; for Commodore VIC-20, 64 and Atari computers.

Boston Information and Technology (BIT)
52 Roland Street
Boston, MA 02129
(617) 666-2488
Dolphin: Battery-operated synthesizer; connects via RS232c port. HAL: Synthetic speech screen access software for use with Dolphin. For IBM PCs/compatibles.

C TECH
130 Pascack Road
Pearl River, NY 10965
(914) 735-7907
SpyGraf: Large print screen access software enlarges text; for all IBM/compatibles. TALLTEX: Large print production software with variable character height/spacing. For all IBM/compatibles and many Epson printers.

Canadian National Institute for the Blind (CNIB)
1929 Bayview Avenue
Toronto, Ontario Canada M4G 3E8
(416) 480-7594
Delta: Hand held optical character reader with Grade 1 braille display (12-character line) and French or German synthetic speech. Connects to most RS232c devices. From Systelec in Palaiseau, France.

Castle Special Computer Services, Inc.
9801 San Gabriel, NE
Albuquerque, NM 87111
(505) 293-8379
COINS AND KEYS: Educational software for identifying computer keys and coins; uses Echo synthetsizer; for Apple II series or IBM/compatibles.

Chatterbox Learning Systems
c/o Voice Learn
ing Systems
2262 Westwood Boulevard
Los Angeles, CA 90064
(800) 531-5314
(213) 475-1036 (in California)
Voice Math: Educational software for use with voice recognition input. Prompts are in large print (2-inch high letters/numerals) and synthetic speech. For Apple II series or IBM/compatibles with existing voice recognition hardware.

Ciderware
104 North St. Mary
Dallas, TX 75214
(214) 827-7734
Lister Talker: synthetic speech database for Apple II series of computers.

Clement Laboratories
2560 Wyandotte Street
Mountain View, CA 94093
(415) 964-0921
CRT Tracking Guide: For TSI's Optacon.

Communicator, The
RT 4, Box 263
Hillsville, VA 24343
(703) 766-3869
Talking Public Domain Software: Variety of educational, games and other software using synthetic speech; for Apple II series computers and Echo synthesizers.

Comp Tech Systems Design
P.O. Box 516
Hastings, MN 55033
(612) 437-1350
Creative Graphics Utilities: Computer digitizers, voice recognition systems, text management software for motion impaired.

Computer Aids Corporation (See under MicroSolutions)

Computer Conversations, Inc.
6297 Worthington Road, S.W.
Alexandria, OH 43001
(614) 924-2885
Verbal Operating System: Synthetic speech screen access and operating system utilities software. Verbal Windows: Synthetic speech access accessory for defining portions of screen to be spoken. Verbal View: Large print screen access software. Above for all IBM/compatibles.

Computerized Books for the Blind (CBFB)
33 Corbin Hall
University of Montana
Missoula, MT 59812
(406) 243-5481

Computer-formatted Books: Members can obtain books on computer disks matched to their system - Apple, CPM, IBM, Eureka A4; includes computer-related texts, American Heritage Dictionary.

Cornucopia Software, Inc.
1625 Beverly Place
Berkeley, CA 94707
(800) 343-2432 (outside California)
(415) 528-7000 (in California)

Electric Webster: Spelling checker for the VersaBraille II and II Plus; IBM-VBII: VersaBraille II and II Plus disk utility software copies VB disk files to/from IBM 3.5-inch disk files.

Cross Educational Software
1802 N. Trenton
P. O. Box 1536
Ruston, LA 71270
(318) 255-8921

Talking Writer: Word processor with large print printing feature. Typing Game: Tutorial. Dragon Maze, Music Game and Space Invaders: Games. Above use synthetic speech software with Apple II computers & Echo synthesizers.

Data Transforms
616 Washington Street
Denver, CO 80203
(303) 832-1501

Fontrix: graphics and typesetting software produces large print; for IBM/compatibles.

Digital Equipment Corp.
146 Main Street
Maynard, MA 01754-2571
(800) 832-6277
(603) 884-8990 (New Hampshire only)

DECtalk 2.0: Speech synthesizer; connects to most computers.

Digitext
325 E. Hillcrest
Thousand Oaks, CA 91360
(805) 495-3456

DIGITEXT: Alternative keyboard/translator for high-speed data entry (based upon shorthand concepts); works with synthetic speech, large print or braille screen access software.

Don Johnston Developmental Equipment, Inc.
P.O. Box 639
Waucaunda, IL 60084
(708) 526-2682

Adaptive Firmware Card: Alternative keyboard input via any of 16 methods such as single or dual switch, head scan, morse code and assistive controls; designed for physically disabled users of Apple computers, but also usable with large print overlays for low vision persons.

Dragon Systems, Inc.
Chapel Bridge Park
90 Bridge Street
Newton, MA 02158
(617) 965-5200

DragonWriter-1000: Voice recognition dictation system with synthetic speech prompts. VoiceScribe-1000: Voice recognition data entry & command system with synthetic speech prompts and error correction by voice; for IBM PCs/compatibles.

Dunamis, Inc.
2856 Buford Highway
Duluth, GA 30136
(404) 476-4934

PowerPad: Graphics tablet and software interface for Apple II series, Atari 400 or 800, Commodore 64 or Vic 20; also IBM PCs/compatibles. Also SpeechPad: Synthetic speech device for non-verbal persons.

Duxbury Systems Inc.
435 King Street
P.O. Box 1504
Littleton, MA 01460
(508) 486-9766

Duxbury Braille Translation System: Braille translation software; for all IBM/compatibles, or Apple Macintosh. Supports American, English, French, Spanish, Swahili, Arabic and other languages using "Grade 2 Braille".

EZ-Reader, Inc.
1408 North Westshore Boulevard, Suite 506
Tampa, FL 33607
(813) 286-2816

EZ-Reader: Hand-held electronic magnification system to enlarge print 10, 20 or 30 times; negative polarity optional. May be connected to any TV set or CCTV monitor.

Electronic Learning Systems
2630 NW 39th Avenue
Gainesville, FL 32605
(904) 375-0558

RAMTalker: Speech synthesizer for Apple IIe & IIgs.

Enabling Technologies Company
3102 Southeast Jay Street
Stuart, FL 33497
(407) 283-4817

Marathon (210 cps), Romeo RB-20 (20 cps), Romeo RB-40 (40 cps) & TED-600 (600 cps "interpoint"): Braille embossers; Romeo Jumbo Braille Module: Changes Romeo braille cells to jumbo-sized. Above embossers connect to most computers. Cicero: Toshiba T-1200F laptop computer with Artic SynPhonix synthesizer and Omnichron Flipper screen access software. Personal Transcription Station: Braille keyboard input device produces braille-like dots on computer screen and creates ASCII file; for use by sighted transcribers.

Exceptional Teaching Aids
20102 Woodbine Avenue
Castro Valley, CA 94546
(415) 582-4859

Listen And Spell: Educational software; 400-word spelling tutorial program for use with Apple II and speech synthesizer.

First Byte
2845 Temple Avenue
Long Beach, CA 90806
(213) 595-7006

KidTalk: Word processor for for young children with both synthetic speech and large print screen/printing capacity; First First Letters & Words: Shapes, Speller Bee: MathTalk: Synthetic speech educational software; above for Apple IIe, IIc, IIgs computers. SmoothTalker: Software-based speech synthesizer for use by program developers.

Flip Track Learning Systems
999 Main St.
Suite 200
Glen Ellyn, IL 60137
(800) 222-3547
(708) 790-1117 (in Illinois)

Flip Track Learning Systems (Apple and IBM): Tutorial cassettes for popular computers and application programs including word processing, spread sheets and databases; also some computer programming courses; all tapes accompanied by regular-size print manuals.

Florida Diagnostic and Learning Resource Center-South (FDLRS)
9220 South West 52 Terrace
Miami, FL 33165
(305) 274-3501

Talking Public Domain Software: Educational software; works with synthetic speech (Echo or Slotbuster) on Apple computers; includes basic and advanced math, history, geography, social studies, science (including computers), vocational and guidance programs, language arts, typing

drills, word processing and games.

Grassroots Computing
P.O. Box 460
Berkeley, CA 94701
(415) 644-1855
VIDEO-VOICE: Synthetic speech screen access software; for IBM PCs/compatibles.

HFK Software
68 Wells Road
Lincoln, MA 01773
(617) 259-0059
QWP: Synthetic speech word processing software; upgrade of Vert Qwerty; For use with TSI's Soft Vert/Vert Plus on all IBM/compatibles.

Hartley Courseware, Inc.
133 Bridge Street, Box 419
Diamondale, MI 48821
(800) 247-1380
Dr. Peet's Talk/Writer: Educational software for Apple computers; uses large print and synthetic speech for letter recognition and introductory word processing; for ages two to six; not specifically designed for visually impaired users.

Henter-Joyce, Inc.
7901 4th Street North, Suite 211
St. Petersburg, FL 33702
(813) 576-5658
JAWS: Synthetic speech screen access software; works with most synthesizers; for IBM PCs/compatibles & PS/2.
Form-Mate: Aids in filling out & printing pre-printed forms; works with most synthetic speech screen access products and IBM PCs/compatibles & PS/2.

Hollingsworth, H. H.
692 South Sheraton Drive
Akron, OH 44319
(216) 644-2421
World Series Baseball: Talking baseball game; works with most speech synthesizers. For IBM PCs/compatibles.

Hooleon Corp.
Page Springs Road
P.O. Box 201
Cornville, AZ 86325
(602) 634-7515
Touchdown Key Top Expanders: Key caps for IBM PC & XT models, special key identification labels and overlays.

HumanWare, Inc.
6140 Horseshoe Bar Road, Suite P
Loomis, CA 95650
(800) 722-3393
(916) 652-7253 (in California)

Braille-n-Print MK II: Perkins Brailler modification converts braille to typewriter output; many user-defined options. Braille-n-Print Slimline: Same as above except clips on/off of Perkins Brailler; also includes 24k buffer. Clearview: 17-inch CCTV with digital camera; electronic magnification system to enlarge print; XY table; over/underlining, split screen (optional for computer use), windowing; monitor screen colors B&W, green or amber. Index Advanced & Classic: Braille embossers; 50 cps & 25 cps with 6- or 8-dot cells, sideways & graphics modes. Index Domino: Interpoint braille embossers; 100 cps (300 pages per hour) with 6- or 8-dot cells. KeyBraille 200 & 360: Refreshable braille terminal hardware/software packaged with either a Toshiba T-1000 or T-1600 laptop computer; 25= or 45=cell 6/8-dot braille display; Perkins-style keyboard plus cursor pad. Keynote Plus (Toshiba T-1000), Keynote XT (Toshiba T-1200): Laptop computer with built-in synthesizer and screen access software. Keynote DI & DX: Keynote software with internal (DI) or external (DX) Accent synthesizer; for IBM PCs/compatibles. Keyword: synthetic speech spelling checker for Keynote. Keyplus: Synthetic speech scientific calculator software for Keynote. PC-Term, Apple-Term, 3270-Term, Poly-Term: Synthetic speech data/telecommunications software for Keynote. Ransley Braille Interface (RBI): Braille translation hardware device; connects between computer and braille embosser. Speakwriter 2000: Talking typewriter, uses Brother CX-90 model modified with synthetic speech. Viewpoint: 14-inch CCTV with handheld digital camera; electronic magnification system to enlarge print (10-40X); rollers on camera aid horizontal tracking; Monitor screen colors B&W, green or amber; optional writing stand; 21 pounds.

Hy-Tek Manufacturing Company, Inc.
1980 Route 30
Sugar Grove, IL 60054
(708) 466-7664

Note-A-Braille: Notetaker with braille keyboard and RS232c port for transferring files to external device.

IBM Educational Systems
National Support Center
for Persons with Disabilities
P. O. Box 2150
Atlanta, GA 30055
(800) 426-2133 (Voice & TDD)
(404) 988-2733 (in Georgia, voice)
(404) 988-2729 (in Georgia, TDD)

IBM Screen Reader: Synthetic speech screen access

hardware/software specifically designed for all IBM PS/2 models and XT or AT/compatibles; has "profiles" providing easy use for WordPerfect, Lotus 1-2-3, SideKick, dBase III Plus, DisplayWrite 4, Writing Assistant and 3270 & 5250 emulation. Works through RS232c interface with most speech synthesizers. Resource Center: For persons with disabilities regarding information about IBM products and other assistive technology for all disabilities.

Intelligent Info Technologies
Station A, Box 5002
Champaign, IL 61820
(217) 359-7933
ED-IT (B1): Software for braille transcribers using Apple II computers.

Interface Systems International
P.O. Box 3289
Portland, OR 97220
(503) 256-3214
I-SOS: Synthetic speech screen access software for IBM PCs/compatibles; permits reading of full text even if not displayed on the computer's monitor.

Intex Micro Systems
725 South Adams Road, Suite L-8
Birmingham, MI 48011
(313) 540-7601
Intex Talker: Speech synthesizer. Connects to RS232c serial port.

Kansys, Inc.
1016 Ohio
Lawrence, KS 66044
(913) 843-0351 or 864-4600
PROVOX: Synthetic speech screen access software; for IBM PCs/compatibles; works with Echo GP & PC Plus, Synphonix 200, Votalker IIB and Votrax PSS synthesizers. TURBOBRAILLE: Braille translator/formatter; for IBM/compatibles. NAMES: Name/Address/Phone database; works with all synthetic speech screen access products; for IBM/compatibles.

Key Tronic Corp.
P.O. Box 14687
Spokane, WA 99214
(509) 928-8000
Key Tronic 5152V: Voice recognition keyboard input system for IBM PCs/compatibles.

Kidsview Software, Inc.
P.O. Box 98
Warner, NH 03278
(603) 927-4428

KIDSWORD: Large print word processor for children; works with Apple IIe/IIgs or Commodore 64, 64C & 128 computers. MOUNT MURDOCH: Large print (4X) adventure game; works with above computers plus IBM PCs/compatibles.

Kurzweil Applied Intelligence Inc.
411 Waverly Oaks Road
Waltham, MA 02154
(617) 893-5151

The Kurzweil Voice System: 1,000-word/phrase voice recognition data entry system; for IBM PCs/compatibles.

Kurzweil Computer Products, Inc.
185 Albany Street
Cambridge, MA 02139
(800) 343-0311
(617) 864-4700

Xerox/Kurzweil Personal Reader: OCR converts print into synthetic speech; DECtalk synthesizer built-in; Comes with hand-held and/or flat-bed scanner; documents may be saved to computer through RS232c interface. PC/KPR: OCR converts print into computer-based text; adapted from company's Discover line of OCRs; requires host IBM PC/compatible; saves text to several word processor formats.

Laureate Learning Systems, Inc.
110 East Spring Street
Winooski, VT 05404
(802) 655-4755

Microcomputer Language Assessment and Development Systems: Educational software tool for language assessment/intervention; uses high resolution letters (3/4-inch high) and synthetic speech (Apple II computers with Echo synthesizer). Audible Career Explorer: Career guidance software with synthetic speech for IBM PCs/compatibles with hard disk; works with Echo PC Plus. Also cause and effect games for low-functioning persons. All programs single-switch accessible.

Life Science Associates
1 Fenimore Road
Bayport, NY 11705
(516) 472-2111

Arithmetic 1, 2 & 3: Math educational software for use with Apple II computers and Echo speech synthesizers.

Lorin Software
1106 Summit Pointe Way
Atlanta, GA 30329
(404) 636-6053
Illustrations: Instructional software for creating tactile graphics; for use with any braille embosser connected to an Apple II series computer.

LS&S Group
P.O. Box 673
Northbrook, IL 60065
(800) 468-4789
Magnicolor MC-I: 19-inch color CCTV series; electronic magnification system to enlarge print/handwriting on monitor screen.

Lyon Computer Discourse, Ltd.
1009 Kinloch Lane
North Vancouver, B.C. V7G 1V8
(604) 251-3015
Lyon Large Print: Large print screen access hardware/software; for all IBM PCs/compatibles and PS/2s/compatibles.

MECC
3490 Lexington North
St. Paul, MN 55126
(612) 481-3550
Early Learning Series: Includes Reading Series, Clockwise and other educational software; some designed for synthetic speech access with Apple II series computer and Echo synthesizer; see also under American Printing House.

Micro Engineering
955 Camino La Maida
Thousand Oaks, CA 91360
(805) 492-1003
Microbraille: Grade 2 braille transcription software for use by sighted transcribers; for IBM PCs/compatibles.

Micromint, Inc.
25 Terrace Drive
Vernon, CT 06066
(203) 871-6170
MicroVox and SWEETTALKER: Speech synthesizers.

MicroSolutions
5805 Breconshire Drive
Fort Wayne, IN 46804
219/436-4391
[The following products were originally from Computer Aids Corporation] - Sounding Board: synthesizer for IBM PCs/compatibles & some laptops. Braille-Talk & Braille-Talk PC: Braille translation software; for use with Apple II or

IBM PCs/compatibles. Calc-Talk: Four-function/scientific synthetic speech software-based calculator for use with Apple II computers. Desktop Voice Package: Screen access software for IBM PCs/compatibles. File-Talk: Synthetic speech database for Apple II computers. Term-Talk: Synthetic speech data communications access software for Apple II computers. Word-Talk: Integrated synthetic speech/word processor for Apple II computers. Work Station Pro: Synthetic speech menu manager for use with applications such as Word-Talk, Calc-Talk or most ProDOS programs; for Apple II computers using ProDOS.

Microsystems Software, Inc.
600 Worcester Road
Framingham, MA 01701
(508) 626-8511 or FAX 508/626-8515

HandiView: Large print screen access software for use with PC applications; 8x magnification; for all IBM PCs/compatibles; works together with HandiCode. HandiCode: Morse-code input software (alternative keyboard) for motion impaired users; also supports DECtalk, Echo or Votra IBM PCs/compatibles.

MicroTalk Software
337 S. Peterson Avenue
Louisville, KY 40206
(502) 896-1288

ProBRAILLE: Braille translation software. ProTERM: Telecommunications. ProWORDS: Word processing. ProBASIC: Basic programming editor. EDY: Assembly language source code editor; all above, synthetic speech software for Apple computers and Echo speech synthesizers.

National Association to Preserve the Use of Braille
c/o Betty Nicely, President
3618 Dayton Avenue
Louisville, KY 40207
(502) 897-2632

Random House Concise Dictionary: VersaBraille II Plus disk version.

National Braille Association
1290 University Avenue
Rochester, NY 14607
(716) 473-0900

Manuals: Variety of braille manuals for computers, programming and calculators.

National Braille Press
88 St. Stephen Street
Boston, MA 02115
(617) 266-6160

Manuals: Variety of braille manuals for computer peripherals. Also, Second Beginner's Guide to Personal

Computers for the Blind and Visually Impaired.

National Institute for Rehabilitation Engineering (NIRE)
P.O. Drawer T
Hewitt, NJ 07421
(201) 853-6585
LWP: Simple word processor will enlarge print (2-4X). Designed for beginners, learning disabled, persons with stroke, short-term memory loss, etc. For IBM PCs/compatibles.

New Concepts Marketing, Inc.
P. O. Box 261
Port Richey, FL 34673-0261
(813) 842-3231
Compu-Lenz: Optical magnifier placed in front of standard monitor used to enlarge print two times.

Omnichron
1438 Oxford Avenue
Berkeley, CA 94709
(415) 540-6455
Flipper: Synthetic speech screen access software; for IBM PCs/compatibles & PS/2. Supports Artic SynPhonix and DECtalk synthesizers.

Optelec
325 Ayer Road
Harvard, MA 01451
(508) 772-3395
Optelec FDR series of 19-inch B&W CCTVs: Electronic magnification systems to enlarge print/handwriting on monitor screen. LP DOS & LP DOS Deluxe (with El-Picasso): Large print screen access software, latter with graphics capability; for IBM PCs/compatibles & PS/2s. Twenty/20: electronic magnification system; B&W 14-inch CCTV to enlarge print on monitor screen.

Opteq Vision Systems
17355 Mierow Lane
Brookfield, WI 53005
414/784-4979
Opteq I: CCTV to enlarge print or handwriting on 13-inch B&W monitor up to 45X. Opteq II: Same except 19-inch monitor and up to 60X plus distance viewing capacity. Opteq IIT: Same as Opteq II with typewriter viewing option. Opteq III: Split-screen, two camera CCTV 19-inch B&W monitor, up to 60X and computer interface capability. Opteq IV: 13- or 20-inch color CCTV with CCD camera, up to 45X or 60X. Opteq V: Split-screen 19-inch B&W CCTV for interface with IBM Pcs/compatibles (software not included). Opteq VI: Portable CCTV camera supplied with two 13-inch B&W monitors; comes with carryng case for camera.

Overseer Electronic Visual Aids
6826 Logan Avenue South
Richfield, MN 55423
(612) 866-7606
OVERSEER 12- & 19-inch B&W CCTVs: Electronic magnification systems to enlarge print/handwriting on monitor screen.

Personal Data Systems, Inc.
P.O. Box 1008
Campbell, CA 95009-1008
(408) 866-1126
Audapter: Battery-operated/AC speech synthesizer for RS232 or parallel interface to all computers. Specifically designed for blind users.

Prentke Romich Company
1022 Heyl Road
Wooster, OH 44691
(216) 262-1984
Alternative keyboards/switches for motion impaired.

Prodigy Products Company
14152 Superior, Suite 4
Cleveland Heights, Ohio 44118
(216) 932-1413
Loc-Dots: Raised-dot adhesive labels for keyboards.

Productivity Software International
1220 Broadway
New York, NY 10001
212/967-8666
PRD Plus: Memory resient software aids persons with limited keyboard skills through "expanding abbreviations"; compatiable with WordPerfect, Lotus 1-2-3 & other applications; recognizes thousands of user-definable abbreviations; for IBM PCs/compatibles. PECK: Software permits use of single finger or mouth stick to operate control, shift & alt keys; works with PRD Plus.

R. C. Systems, Inc.
121 West Winesap Road
Bothell, WA 98012
(206) 672-6909
Appleworks Companion: Enables AppleWorks 2.0 to be accessible through synthetic speech. DoubleTalk: Synthesizer which works automatically as either Slotbuster or Echo-type product. SCAT: Screen access software. Slotbuster II: Multi-function card with synthesizer, serial and parallel ports. All above for Apple II series computers.

Raised Dot Computing, Inc.
408 S Baldwin St.
Madison, WI 53703
(608) 257-9595

BEX: Word processor, braille translator & device driver with synthetic speech, large print screen access. ClasX: Utility for use with TranscriBEX to format for either paper braille or refreshable braille output. MathematiX: Mathematical notation synthetic speech software for use with BEX 2.2 or 3.0 designed to produce properly formatted ink-print. QTC: Text file conversion for BEX, ProDOS and DOS 3.3 files. SBEX: Synthetic speech screen access software for many serial-driven synthesizers. TranscriBEX: Braille textbook production software - all above for Apple II computers. Hot Dots: Braille translation software for IBM PCs/compatibles. pixCELLS: Braille graphics software drawing tool for use with Apple II computers and most braille embossers.

Robotron, Pty., Ltd.
253 West 72nd Street, Suite 306
New York, NY 10023
(212) 580-5956

Eureka A4: Laptop computer with Perkins-style braille keyboard (or alternative QWERTY keyboard) plus function keys; synthetic speech output. Includes 3.5-inch disk drive, word processor, diary/calendar, database, phone directory/dialer, modem, music composition software. Interfaces with any computer, braille embosser and most printers. BrailleMaster: Braille translation software; for IBM/compatibles.

Rossi, Peter
P.O. Box 538
Allwood Station
Clifton, NJ 07012-0538
(201) 235-0526

Audio Braille: Tutorial for learning Grade II braille by using synthetic speech prompts; for Apple II computers and Echo synthesizers.

Roundley Associates
P.O. Box 608
Owings Mills, MD 21117
(800) 333-7049

NFBTRANS: Braille translation software; for use with IBM/compatibles and braille embosser.

Scholastic Inc.
P.O. Box 7501
2931 E. McCarty Street
Jefferson City, MO 65102
(800) 325-6149
(800) 392-2179 (Missouri)

Talking Text Writer: Educational word processing software for pre-school and primary grades. Talking Text Library: Reads stories; introduction to history and the classics; for primary grades. Both programs use synthetic speech on Apple II computers with an Echo synthesizer.

Scialli, Peter
630 Park Street, Apt. X
Charlottesville, VA 22901
(804) 296-1527
Ultimate Banker: Synthetic speech checking accounts software for Apple II computers with Echo synthesizers.

Science Application International Corporation
135 Old Solomon's Island Road
Annapolis, MD 21401
(301) 266-0994
Braille Telecaption System: Permits deaf-blind users to read TV captioning via braille. Works with standard captioning decoders and TeleBraille (from TSI/VTEK or other refreshable braille display device using a Baudot modem.

Seeing Technolgies, Inc.
7074 Brooklyn Boulevard
Minneapolis, MN 55429
612/560-8080 (call collect)
SEETEC STC20: 20-inch color CCTV with CCD camera; electronic magnification system to enlarge print or handwriting on a monitor screen up to 60X. SEETEC STC13: Same as above with a 13-inch monitor up to 45X. SEETEC STBW19: Same except B&W 19-inch monitor up to 60X. SEETEC STBW12: Same except B&W 12-inch monitor up to 45X.

Sierra Digital Research, Inc.
7900 North Virginia, Suite 223
Reno, NV 89506
(702) 972-1420
Video Speech: Synthetic speech screen access software for IBM PCs/compatibles; requires Echo GP speech synthesizer.

Southland Manufacturing Company
680 Bizzell Drive
Lexington, KY 40510
(606) 253-3066
PortaBraille: Notetaker with braille keyboard and refreshable braille display; connects to RS232c serial devices.

Speech Plus, Inc.
461 North Bernardo Avenue
P.O. Box 7461
Mountain View, CA 94039-7461
(415) 964-7023
CallText 5050, Prose 2000: Speech synthesizers; for IBM

PCs/compatibles or RS232c serial connection.

Stat Talk Computer Products
285 Hardenbourgh Avenue
Demerest, NJ 07627
(212) 581-8291
Stat Talk: Synthetic speech statistical software; for Apple II computer & Echo synthesizer.

Street Electronics
6420 Via Real
Carpinteria, CA 93013
(805) 684-4593
Echo IIb & IIc: Speech synthesizers for Apple IIe, IIc or IIgs; Echo MC: Same for IBM PS/2, Models 50-80; Echo GP & PC Plus: Same for IBM PC/XT/AT/compatibles; Echo 1000: Same for Tandy 1000 EX & HX; microECHO: Same for laptops.

Summit Computer Systems, Inc.
6 East Willow Grove Avenue
Philadelphia, PA 19118
(215) 247-3660
Blackboard: Synthetic speech access hardward card with foot pedal. Permits use of standard Apple software; requires an Echo, Votrax or DECtalk speech synthesizer and Apple IIe computer.

Sunburst Communications
39 Washington Ave., Box 30
Pleasantville, NY 10570-9971
(800) 431-1934
(NY 800-221-9971)
Magic Slate II: Large print word processor; uses 20-, 40-, 80-columns; works iwth Appli II computers; for elementary and junior high. Other educational software for grades K-12; for Apple II computers.

Syn-Talk Systems & Services
70 Estero Avenue
San Francisco, CA 94127
(415) 334-0586
Prompt Writer: Word processor with synthetic speech hardware/software; for IBM PCs/compatibles.

Syntha-Voice Computers, Inc.
1037A Levick Street
Philadelphia, PA 19111
(416) 578-0565 (Canada)
(800) 263-4540 (USA)
NOMAD: Laptop computer with either Perkins-style braille or QWERTY keyboard; translates Grade 2 braille input into English synthetic speech; two 3.5-inch disk drives; 2400-baud Hayes compatible modem; suppoorts text-based MS DOS applications; also supports separate mono/color moniters;

interfaces with IBM PCs/compatibles. Porta-Pak: Battery/AC synthesizer; for Apple, Commodore or IBM/compatibles or any laptop; uses RS232c interface. Porta-SLIM: Same as above, together with SLIM screen access software; for IBM PCs/compatibles and PS/2, Models 25 & 30. SLIM: Synthetic speech screen access software and synthesizer; for IBM PCs/compatibles.

Talking and Visual Aids
8136 Appoline
Detroit, MI 48228
(313) 935-1266
P-SEE CCTV System: 13-inch & 19-inch color CCTVs; electronic magnification system to enlarge print/handwriting on monitor screen.

Talking Computers, Inc.
140 Little Falls Street, Suite 205
Falls Church, VA 22046
(703) 241-8224
Talk-To-Me Tutorial Series: Cassette-based training programs designed for visually impaired users; available for MS/DOS, WordPerfect, Lotus 1-2-3, dBASE, Artic Vision/Business Vision, Soft Vert, Vert Plus; all applications use IBM PCs/compatibles.

Talktronics, Inc.
27341 Eastridge Drive
El Toro, CA 92630
(714) 768-4220
64-TALKER: Speech synthesizer for the Commodore 64. VIC-TALKER: Speech synthesizer for the Commodore Vic-20.

Tecmar, Inc.
6225 Cochran Road
Solon, OH 44139-3377
(216) 349-0600
Speech Master: Speech synthesizer/software for IBM PCs/compatibles.

Telesensory/VTEK
455 North Bernardo,
P.O. Box 7455
Mountain View, CA 94039-7455
(415) 960-0920 (California)
(800) 227-8418 TSI
(800) 345-2256 VTEK
[TSI Products] - BrAT: Interface software for VersaBraille II Plus. BIT (Braille Interface Terminal): Refreshable braille display terminal with joy stick control and Perkins-style keyboard. The Navigator: Refreshable braille display with 20 or 40 cells, 6- or 8-dot braille; permits use of QWERTY keyboard for braille input; for use with any MS DOS compatible computer or Toshiba T-100, T-1200 or Sharp

4581 laptop. VersaBraille II Plus: Refreshable braille portable computer. VersaPoint: Braille embosser. VP Graphics: Software converts MS DOS graphics for VersaPoint embossing (requires vision to use). MEVA Plus: Portable handheld battery-powered CCTV; 4-inch flat screen monitor; camera with separate lenses to enlarge print at four different magnification levels (3, 4, 5 or 8X); softpack carrying case. MEVA: Same as above with one lens. MEVA Camera: Same as above wihtout monitor; may be connected to any TV monitor or computer monitor. AdVantage, Vantage: 19-inch & 14-inch B&W CCTVs; electronic magnification systems to enlarge print/handwriting on monitor screen, both with computer interface capacity. Vista (MDA, CGA or EGA), Vista VGA (also VGA) & Vista 2: Mouse-driven large print/graphics screen access hardware/software; first two for IBM/compatibles, latter for IBM PS/2, Models 50-80. Soft Vert: synthetic speech screen access. Vert Plus: synthetic speech screen access software & synthesizer board in choice of English, German orSpanish. Vert Attache: Menu-oriented utility including directory manager, WordPerfect Jr. word processor, scientific calculator & others. Optacon II: Converts print, handwriting or computer ASCII text to tactual representation. Optacon II PC Access: Permits tactual access to IBM/compatibles screen display. All above are IBM PC/compatible. VBII Plus and VersaPoint also connect to RS-232c serial ports, including Apple, Commodore, Tandy, etc.

[VTEK Products] - BDP (Braille Display Processor): Refreshable braille screen access. MPRINT: Perkins brailler modification converts braille into ink-print. MBOSS-35, Thiel BETA-3: Braille embossers. DP-10 for Apple, DP-11 & DP-11 Plus for IBM PCs & PS/2 Model 30, DP-12 for AT&T 6300: Large print screen access hardware/software. Voyager 12- & 19-inch B&W CCTV series: electronic magnification system to enlarge print/handwriting on monitor screen; also works with DP-10/11/12 computer interfaces.

Transceptor Technologies, Inc.
2001 Commonwealth Boulevard, Suite 205
Ann Arbor, MI 48105
(313) 996-1899

Personal Companion Model 100: Voice recognition (input) and synthetic speech (output) communications tool operated entirely by voice, no keyboard or other controls; PC-based with 40mb hard disk; has phone list building/dialing/answering, calculator, bank book, notepad, reminder, appointment calendar; also permits downloading of newspapers, magazines electronically; can control turning on/off of appliances. Personal Companion 100/M: Same as above but with monitor displaying information in large print.

Traxler Enterprises
6504 W. Girard Avenue
Milwaukee, WI 53210
(414) 445-5925
Trax-Pax: Synthetic speech checkbook/checkwriting software; for Apple II computer & Echo synthesizer.

T.S. Microtech
12565 Crenshaw Boulevard
Hawthorne, CA 90250
(213) 644-0859
Dreamer: Keyboard adaptation software permits single key operation of multiple key combinations (control, shift or alt with other keys); for application programs including WordPerfect, WordStar, MultiMate, DisplayWrite, Lotus 1-2-3 and Symphony.

Turbo Power
3109 Scotts Valley Drive, Suite 122
Scotts Valley, CA 95066
(408) 438-8608
BIGED: Large print word processor; 40-64 columns per screen in four steps; 7-11 rows of text; based upon WordStar commands; for IBM PCs/compatibles with CGA or EGA color display adaptors.

Unicorn Engineering Co.
6201 Harwood Ave.
Oakland, CA 94618
(415) 428-1626
Expanded Keyboard Model 1: Programmable alternative keyboard designed for persons with cerebral palsy and other motion impairments; for Apple II computers.

Visual Methods, Inc.
35 Charles Street
Westwood, NJ 07675
201/666-3950
LV 101: Portable handheld battery-powered CCTV; 4-inch flat screen monitor; digital or analog camera with separate lenses to enlarge print at three different magnification levels; may also connect to any other CCTV monitor or TV set; attache carrying case. LV 102: Same as above without built-in monitor & battery pack. LV 103: Analog camera enlarges print onto any TV set or computer monitor; choice of one of three interchangeable lenses.

Visual Solutions, Inc.
P.O. Box 2338
Davenport, IA 52809
(319) 322-5778
Magna-Reader 1000: 12- & 19-inch B&W CCTVs; electronic magnification systems to enlarge print/handwriting on monitor screen.

VITAL
29 Maple Drive
Swoyersville, PA 18704
(No telephone listed)
Checkrite II: Checking account/check writer software. Talking Mail and Phone Manager: Mailing list and telephone directory synthetic speech software; all for Apple IIe or IIc computer & Echo speech synthesizer.

Voice Connection, The
17835 Skypark Circle, Suite C
Irvine, CA 92714
(714) 261-2366
IntroVoice I & II: Voice recognition data entry system with synthetic speech screen output; for Apple II & Echo or Votrax speech synthesizers. IntroVoice VI: Same for IBM PCs/compatibles; may be used with RS232c-connected synthesizers.

Votrax Consumer Products Group
1394 Rankin Drive
Troy, MI 48083-4074
(800) 521-1350
(313) 588-2050
Personal Speech System, Type 'n' Talk, Votalker: Speech synthesizers; connect to RS232c serial port of Apple, IBM & other computers.

VTEK (See under TSI/VTEK)

Washington Computer Services
2601 North Shore Road
Bellingham, WA 98226
(206) 734-8248
Font Magic: Large print screen access and print production software; for IBM PCs/compatibles.

Zygo Industries, Inc.
P.O. Box 1008
Portland, OR 97201
(503) 297-1724
Computer-based writing aids and computer access for quadriplegics.

Braille Alphabet and Numerals

a b c d e f g h i j k l m

n o p q r s t u v w x y z

Capital Sign Number Sign Period Comma

The six dots of braille cell are arranged and numbered: 1 4 2 5 3 6

The capital sign, dot 6,
placed before a letter makes a capital letter.

The number sign, dots 3, 4, 5, 6,
placed before a character, makes a number:
a preceded by the number sign is 1, b is 2, etc.

National Library Service
for the Blind and Physically Handicapped
Library of Congress
Washington, D.C. 20542

AMERICAN FOUNDATION FOR THE BLIND, INC.
15 West 16th Street, New York, NY 10011

NATIONAL TECHNOLOGY CENTER

The National Technology Center of the American Foundation for the Blind has been established to provide a resource for blind and visually impaired persons, professionals in education and rehabilitation, employers, researchers, and developers and manufacturers of aids and devices. The Center has three components: National Technology Data Base; Evaluations; Research and Development.

NATIONAL TECHNOLOGY DATA BASE

Information about commercially available products for blind/visually impaired persons--ranging from canes, braille watches to sophisticated computer systems.

Information on courses available at training/education centers.

Funding sources.

Names of users of adapted equipment, as a resource for occupational and technical information.

Information on previous evaluations performed on devices.

This information will be logically linked for comprehensive information on products and related information.

Information available via a toll free number
1-800-AFB-LIND

EVALUATIONS

Evaluations will be performed on both new and existing devices and results published regularly in accessible media.

Evaluations personnel will work with manufacturers and consumers to provide essential information on particular device capabilities and to aid in the manufacturers' design of new devices.

RESEARCH AND DEVELOPMENT

The engineering group will design devices to meet the needs of visually impaired persons in: Employment, Independent Living, Education, and Mobility.

March 1986

Center for
Special Education
Technology

Tech Use Guide

Using Computer Technology

Visual Impairments

Students who are blind or partially sighted are unable to read printed text, or have great difficulty seeing various sized text. Written material must be enlarged or transcribed into a tactile or auditory media. For students who have visual impairments, as well as their sighted peers, producing written material is essential for communicating with teachers, family, and friends. Their written ideas must be presented in a form that is understood by sighted individuals. Sophisticated computer technology provides powerful tools to help students who have visual impairments accomplish these tasks. Special devices can assist students with reading independently, communicating through printed text, and accessing computerized information.

Auditory Text Access

For centuries people with visual impairments have relied on friends and family members to read printed material to them. The discovery of "Talking Books" (long-play records which books were recorded on) gave the person with visual impairment some independence in reading. When cassette tapes became popular with the general public, it was found that printed material could be recorded faster and much more economically. Recordings For The Blind, Inc., and many community organizations/agencies and volunteer groups will record textbooks, articles, manuals, classroom handouts, and other material for students. The cassette tape recorder has been found to be a very versatile tool for people with visual impairments. In addition to being used for reading recorded books, it can be used to record personal messages/notes, classroom lectures, and frequently needed directions (operating instructions, travel directions, recipes, etc.).

Despite the portability of cassette recorders, they are somewhat bulky and cumbersome. Through using adapted tape recorders which record and play cassette tapes at a speed of 15/16 ips and utilize four recording tracks on the cassette tape, the capacity of a standard cassette is more than doubled. With a cassette tape's increased ability to contain a large volume of information, a system for locating specific information on a tape was needed. An audible tone can be added to a tape at the time of recording. This beep-like tone can only be heard when the tape is being rewound or fast-forwarded. The beep can be used to indicate the start of a chapter, message, recipe, or important information during a class lecture.

In addition to the cassette tape recorder, there are the commercially available phone answering machines. Many new models have a memo system which allows a message to be left on the machine without calling in on the phone. This allows both sighted and nonsighted people to leave messages for each other in an organized manner, which is accessible to all.

The auditory text access methods discussed thus far cannot provide the visually impaired reader with immediate access to printed text. Optical character recognition (OCR) systems can do just this. By placing printed material on an optical scanner (similar to a photocopy machine) the text is translated into a synthesized voice output. The reader has complete control over re-reading any paragraphs, sentences, words, or letters. Modern technology has made the Kurzweil Reader somewhat portable by reducing its weight to approximately 30 pounds and using a hand-held scanner. Optical character recognition systems offer individuals with visual impairments complete freedom to read what they want, when they want.

Text Enlargement

Students with visual impairments who have some functional vision may be able to read printed texts by using handheld magnifiers. Many of these magnifiers are small enough to be carried in a pocket or purse. Others which are larger and too bulky to carry around, are best left in one place where reading is most often done. Identifying an appropriate magnifier for a person with a visual impairment should be done by a low vision specialist and the person who has visual impairments.

Many individuals with visual impairments are unable to be assisted by handheld magnifiers. In these cases, it might be helpful to use large-print books. The American Printing House for the Blind, as well as other agencies, produce large-print text, hobby, and leisure-reading books. The size of the text in a large-print book depends on the reading level of the text. Books written for a reading level of grades 1-3 are produced in 18- point print, grades 4-7 in 14-point print, and grades 8-12 in 12- point print. This is only a general standard and is not followed by all companies. The increase in the print size often results in

large, heavy, and bulky books. Transporting these books from class to class or from school to home is cumbersome. The size and weight of large print books may also cause some individuals neck, shoulder, and arm fatigue during reading.

A high-tech solution to obtaining enlarged text is the "Closed Circuit Television" (CCTV) system. A CCTV uses a camera to magnify the text and displays it on a 14" or 19" monitor similar to a television screen. Text can be enlarged up to 60 times on some models of CCTVs. There are a few types of monitor displays which can accommodate various types of visual impairments. Possible configurations include black on white or white on black, amber, and green displays. Color displays are not available, but are currently being developed by CCTV manufacturers. The camera/monitor make-up of most CCTVs requires that it remain in one place. Despite the CCTVs ability to give students with visual impairment the greatest access to printed material, the lack of its portability dictates when and where reading can be done. There are portable models available which contain the monitor and camera all in one unit weighing around 30 pounds. A new CCTV system on the market uses a handheld camera. The camera is small enough to carry with you and use with a standard 14" monitor located at school and home.

The CCTV is not limited to being used for only reading. Some CCTVs can integrate keyboards and printers to form complete computer terminals or word processing systems, thus allowing many users can produce handwritten materials or perform other fine motor tasks.

Tactile Text Access

Braille has been used by persons with visual impairments for many decades. This system of various combinations of six raised dots is the only media for producing written material for those individuals who are unable to read printed text. Two levels of braille, Grade I and Grade II, are used most often. Grade I braille is similar to inkprint, in that every word is written out letter-for-letter. This form of braille is rarely used as it is very bulky and slows down the reader. Grade II braille is much like shorthand. Symbols or signs are used to represent frequently used words and combinations of letters. Despite this compact format of braille, it is still very bulky and requires much storage space.

There are a number of braille codes which meet the needs of various types of written notation. These include nemoth code (used in math), braille music code, and computer braille codes. Each code uses the same combinations of dots, but assigns different meanings to each sign/symbol.

Producing braille for personal notes or communication with another person who knows braille can be done with a Perkins Brailler or a slate and stylist. Both methods are readily used and reliable. The Perkins Brailler is the most common method of producing braille; however, the brailler itself is quite heavy and not really suited for portability. A more portable and quiet method of producing braille, but one which requires a high level of skill, is the slate and stylist. It is useful for writing personal messages and notes.

Braille is very useful for individuals with visual impairments, but very few sighted individuals know how to read it. The students who have visual impairments must have a way of producing printed information. In the past this has been done with traditional typewriters. The student with visual impairments would translate his/her hands back and forth from the braille copy to the typewriter keyboard. Another inherent problem is the student with visual impairment inability to check his/her typewritten work for errors.

There are now devices available which interface the Perkins Brailler with a computer printer. These devices attach to the brailler and convert the braille characters to letters which can be printed out. An internal memory allows the user to edit the written material before printing it.

Obtaining books in braille can be a timely and costly process. The Opticon is an alternative tactile reading method for some students who have visual impairments. A handheld camera is scanned across each line of text and a grid of 144 vibrating pins re-creates the images on the printed page. The student uses his/her index finger to read a raised vibrating image of each letter. The Opticon requires many hours of practice before a user is able to use it efficiently. However, its portability and ability to give individuals with visual impairments immediate access to printed materials makes this device desirable for many.

Portable Notetaking Devices

Until recently, students with visual impairments had very few options for taking notes during class. Braille is slow, tape recording requires time outside class to re-listen to the tape and transcribe it into a hardcopy (braille or large print); and having other classmates take notes is not always reliable. This has changed with the development of portable notetaking devices. These devices utilize speech output and/or refreshable braille display in combination with standard keyboards or a 9-key Perkins Brailler keyboard. These devices are usually lightweight and run on a rechargeable battery or an AC adapter. Information can be stored, retrieved, and edited, as well as printed out.

Computer Access

The increasing use of computers in the classroom was originally thought to be a major problem for students with visual impairments. Instead, computer technology has given them the advantage they have been waiting for. One computer with the appropriate adaptive equipment can meet the many needs of one individual and the varying needs of people with visual impairments.

Information on a computer screen can be enlarged through the use of screen magnifiers, adaptive hardware installed inside the computer and/or software programs. Most hardware and software character enlargement products offer a wide range of text magnification. However, graphics can only be enlarged on the Macintosh computer.

The most popular computer access method for a person with a visual impairment is the use of speech-synthesized voice output. This can be achieved by installing a voice synthesizer unit into an external port on the computer. Before a speech synthesizer can produce voice output, a special software program must be run that will interface with both the speech synthesizer and the software program to which you want to gain auditory output. An example of this for the Apple IIE is a Slotbuster II speech synthesizer card, Apple Companion Speech software, and AppleWorks. A similar setup can be done for an IBM or compatible by using an Artic speech synthesizer card, Artic Vision Speech software, and WordPerfect. Many software packages on the market that are capable of using a speech synthesizer, like the Echo IIb, with no additional speech software.

A third method of accessing the computer is through a tactile display, or refreshable braille display. These devices use 20 sets of 6 pins each to represent 20 braille cells. At a touch of a key the next or previous 20 characters can be displayed. Computer users who prefer braille to auditory output find refreshable braille displays to be unreplaceable. At the present time there are no refreshable braille display devices capable of displaying graphics.

The computer can also be used for producing hard copy braille through the use of braille embossers. Additional software such as BEX or hardware such as the Ramsley braille translator must also be used. These products, as well as others, take print text and translate it to Grade I or Grade II braille before it is sent to an embosser. This process is not dependent on the user knowing Braille. Therefore, students with visual impairments can produce hard copy braille, and teachers can use the same products to create handouts in print as well as in braille at the touch of a key.

A unique feature found in the BEX braille translation software is its ability to convert the computer keyboard to a 9-key Perkin's brailler keyboard. This input method might be found suitable for the young student who knows how to use a brailler, but does not know how to type.

Throughout this guide we have presented only a small sample of adaptive technology to assist the student who has a visual impairment. By contacting the companies and agencies listed at the end of this guide, you will be able to obtain additional information about the devices discussed here, as well as other available devices. It is important to keep in mind that there is no **ONE** device that will meet all the needs of one individual. A person who is able to use a variety of devices and techniques will have greater access to the sighted world. Elementary and high school students with visual impairments who have the opportunity to use a variety of adaptive devices will be able to make informed decisions as to which devices best meet their needs as adults.

Readings

Computer Center for the Visually Impaired. (1985). *Computer equipment and aids for the blind and visually impaired.*. New York: Baruch College, The City University of New York.

Harrell, R., Lloyd, J., & Ryan, F. (1987). *California directory of services and products for the visually impaired.* California: Joint Action Committee of Organizations of and Serving the Visually Handicapped.

Mendelsohn, S. (1987). *Financing adaptive technology: A guide to sources and strategies for blind and visually impaired users.* New York: Smiling Interfaces.

National Braille Press. (1985).*The second beginner's guide to personal computers for the blind and visually impaired.* Boston, MA: Author.

National Library Service for the Blind and Physically Handicapped. (1986). *Reading, writing, and other communication aids for visually and physically handicapped persons.* Washington, DC: Library of Congress.

Resources

The American Printing House for the Blind, P.O. Box 6085, Louisville, KY 40206-0085, 502-895-2405.

National Library Service for the Blind and Physically Handicapped, The Library of Congress, Washington, D.C., 202-707-5100

National Technology Center, American Foundation for the Blind, 15 West 16th Street, New York, NY 10011, 212-620-2143.

Recordings for The Blind, Inc., 20 Roszel Road, Princeton, NJ 08540, 609-452-0606.

Periodicals

Braille Forum, The American Council of the Blind, 190 Lattimore Road, Rochester, NY 14620.

Closing The Gap, P.O. Box 68, Henderson, MN 56044.

Computer Disability News, The National Easter Seal Society, 2023 West Ogden Avenue, Chicago, IL 60612

Journal of Visual Impairment & Blindness, Publications and Information Services Department, American Foundation for the Blind, 15 West 16th Street, New York, NY 10011.

Raised Dot Computing Newsletter, Raised Dot Computing, 408 South Baldwin Street, Madison, WI 53703.

Sensory Aids Technology Update, Sensory Aids Foundation, 399 Sherman Avenue, Palo Alto, CA 94306.

Digitizers, Optical Card Readers, Scanners

AST-Vision Plus Card, AST Research, Inc., Apple Enhancement Product Group, 2121 Alton Avenue, Irvine, CA 92714, 714-553-0340.

Chorus PC-Eye and PC 1540, Chorus Data Systems, Inc., P.O. Box 370, 6 Continental Boulevard, Marrimack, NH 03054, 603- 424-2900.

Compuscan PSC Page Reader, Compuscan, Inc., 81 Two Bridges Road, Building 2, Fairfield, NJ 07006, 201-575-0500.

Digisector Series of Video Digitizers, The Micro Works, P.O. Box 1110, Del Mar, CA 92014, 619-942-2400.

Read-It! OCR VER - 2.0, Olduvai Corporation (USA), 7520 Red Road, Suite A, South Miami, FL 33143, 305-665-4665.

Thunderscan, Thunderware, Inc., 21 Orinda Way, Orinda, CA 94563, 415-254-6581.

Large Print Displays

Apollo Closed Circuit Television Magnifier Products, Telesensory Systems, Inc., P.O. Box 7455, Mountain View, CA 94039-7455, 415-960-0920.

Compulenz, The Able Tech Connection, P.O. Box 2301, Kettering, OH 45429, 513-293-6803.

Large Print Display Processor, VTEK, Inc., 1625 Olympic Boulevard, Santa Monica, CA 90404, 213-829-6841, 800-345-2256, 800-521-5605 (In California.

Viewscan, Telesensory Systems, Inc., P.O. Box 7455, Mountain View, CA 94039-7455, 415-960-0920.

Speech Recognition Devices

Chatterbox Voice Reading Ability Drill, Voice Learning Systems, 2265 Westwood Avenue, Suite 9, Los Angeles, CA 90064, 213-475-1036.

Introvoice I, II, III, IV, The Voice Connection, 17835 Skypark Circle, Suite C, Irvine, CA 92714, 714-261-2366.

Micro-Ear, Artec Systems, Inc., 9104 Red Branch Road, Columbia, MD 20145.

Shadow/Vet Voice Entry Terminal, Scott Instruments Corporation, 111 Willow Springs Drive, Denton, TX 76205, 817-387- 9514.

Speech Synthesizers

Apple Cyber, Cyberon Corporation, 1175 Wendy Road, Ann Arbor, MI 48103, 313-665-8512.

Cricket Speech Synthesizer, Street Electronics Corporation, 1140 Mark Avenue, Carpinteria, CA 93013, 805-684-4593.

Echo+ Speech Synthesizer, Street Electronics Corporation, 1140 Mark Avenue, Carpinteria, CA 93013, 805-684-4593.

Mockingboard B, Sweet Micro Systems, 50 Freeway Drive, Cranston, RI 02920, 401-461-0530.

PC Voice, Arts Computer Products, Inc., 145 Tremont Street, Suite 407, Boston, MA 02111, 617-482-8248.

This Guide was developed by Annette Carr who is employed as a Technical Assistance Officer with the SPH/Deaf-Blind Technical Assistance Center at George Mason University, Fairfax, Virginia.

Additional **Tech Use Guides** on the following topics are available from the Center upon request:

- Guide for Teachers
- Guide for Parents
- Technology in the Workplace
- Computer Access
- Selecting Software
- Selecting Hardware
- Preschool Children
- Learning Disabilities
- Hearing Impairments
- Physical Disabilities
- Telecommunication Networks
- Augmentation Communication

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Personal Health

Jane E. Brody

Improving the quality of life for visually impaired people.

Dr. DeWitt Stetten Jr. was a leading scientist at the National Institutes of Health when a progressive disease of the retina rendered him legally blind. Even with corrective lenses, he could barely see at 20 feet what people with normal vision can see at 200 feet away. Although unable to read or drive, Dr. Stetten was not told about aids to improve the quality of his life by any of the seven ophthalmologists who treated him during 15 years of increasing visual loss.

Distressed by the apparent disinterest of ophthalmologists in blindness, Dr. Stetten wrote in The New England Journal of Medicine about his own discoveries of some of the hundreds of devices and programs that can improve the lives of blind people. His comments drew letters from hundreds of people with similar experiences.

One person in 19 has a visual impairment that cannot be fully corrected by lenses, and 1.4 million are severely impaired. Like Dr. Stetten, they may retain some vision, albeit extremely restricted, or they may only be able to distinguish light from dark, or they may be totally blind. Most once could see but lost their vision to illness or accident, but some have been blind since birth.

Too many of the legally blind live in an unnecessarily dark world, without the many tools that can help them work, travel, care for themselves and enjoy their surroundings. Many have never been told of the training programs that can help them maintain or restore their independence and mobility or the gadgets that can keep them in touch with the printed word, ranging in complexity from simple magnifiers to computer-operated voice synthesizers that can read aloud from printed pages.

About half of Americans who are legally blind have lost useful vision needlessly; their disorders were (and some still are) treatable or preventable. The following are leading causes of preventable blindness in this country:

• Glaucoma, a buildup of pressure in the eyes, can usually be treated with medicated drops or surgery to help prevent visual loss. The condition can be detected early, before vision is damaged, by a simple eyeball pressure test, which should be done every two years (or more often for people at high risk, such as diabetics and those with a family history of glaucoma).

• Cataracts, a clouding of the lenses of the eyes, can be corrected surgically in 95 percent of cases, even in very old and sick people. The damaged lens can then be replaced by corrective lenses or an implanted lenses.

• Diabetic retinopathy, caused by tiny hemorrhages in the light-sensitive retina, can be treated with laser therapy in the early stages. Physicians who treat diabetics often miss the early signs of retinopathy, yet, according to a report last week in The Journal of the American Medical Association, about 30 percent of diabetics have never been examined by an ophthalmologist.

• Macular degeneration, the affliction that robbed Dr. Stetten of useful vision, involves damage to the central retina, which provide vision for reading, driving and other activities. The rapidly progressive form, which each year afflicts about 13,000 people (most of them over the age of 60), can now be treated with laser therapy to prevent loss of vision if immediate action is taken. Check your eyes regularly by covering one eye and looking with the other at the words on a page and then at a straight-line object; if blurring or waviness is noticed, call an ophthalmologist right away.

• Blinding injuries, which afflict many people in their most productive years, can often be avoided by wearing protective goggles or safety glasses during sports activities (especially racquet sports) and when performing hazardous jobs at home and at work. It is also important to avoid retinal burns, such as might occur from direct viewing of to-

When Offering Help

Reactions to blind people vary from avoidance to oversolicitousness to acting as if the person cannot hear or speak. Irving R. Dickman, author of the pamphlet "Living With Blindness," offers these guidelines to help make you truly helpful to a person who cannot see:

• It is always proper to offer your help, but do not feel insulted if the blind person refuses your offer.

• Do not assume you know how to help; ask the person what you can do. But also do not hesitate to issue a warning of immediate danger, such as a overhanging obstacle that would be missed by the person's cane.

• Get a blind person's attention by touching him gently on the elbow. Always tell him when you enter and leave the room he is in, and announce your name when you greet him.

• Do not take a blind person's arm or try to lead him by his cane. Let the person put his free hand around your upper arm and walk a step behind you. That way he can feel which way to walk from your body motions.

• Do not try to pet a guide dog on duty. Even off-duty, ask the master's permission first.

• Ask the blind person, not his companion, what you want to know about him. And do not shout. Nor do you have to worry about using words like "look" or "see" or even "blind" when you speak to him.

• In a restaurant, offer to read the menu to a blind companion, and be sure to include the prices. When food is served, you can help him locate the items on his plate by referring to their positions according to the numbers on a clock face: "The chicken is at 12 o'clock, the carrots at 4 o'clock and the potato is at 8 o'clock."

"Living With Blindness" is available for $1 from Public Affairs Pamphlets, 381 Park Avenue South, New York, N.Y. 10016.

day's eclipse or from looking at the sun through a telescope or camera.

Two currently untreatable conditions are also leading causes of blindness: destruction of the optic nerve, which transfers visual information between the eyes and the brain, and retinitis pigmentosa, a progressive inherited disorder that produces its first symptom, night blindness, during childhood or adolescence.

But even when unpreventable, visual loss does not have to spell the end of productive life or force a retreat into an extremely narrow and protective world. There are literally hundreds of government, voluntary and self-help organizations throughout the country that provide free or low-cost training and equipment to the blind and legally blind.

Currently only about half of legally blind individuals are registered with state agencies for the blind that might inform them of useful opportunities and information. (In New York, the responsible agency is the Commission for the Blind and Visually Handicapped, 40 North Pearl Street, Albany, N.Y. 12243.) The American Foundation for the Blind publishes a Directory of Agencies Serving the Visually Handicapped in the U.S. It is available in many libraries.

With the aid of training programs and low-vision aids, even totally blind people can go to regular schools and perform jobs that are assumed to require the ability to see. Blind people have worked successfully as teachers, writers, musicians, lawyers, politicians, executives, physicists, psychologists, tax consultants, broadcasters, piano tuners, computer programmers, mechanics and dancers.

Dr. Stetten tells of some of the devices that helped him: Visualtek, a televisionlike machine that greatly magnifies printed or written material; the free Talking Books Program operated through the Library of Congress; Recorded Periodicals, which helped him keep up with scientific literature; a Braille watch and a Talking Clock (push a button and a voice announces the time), and a Kurzweil reading machine that scans printed or typed pages and reads them aloud.

There are also machines that translate printed words into Braille; Braille typewriters; Optacon, which translates what it sees into an image that can be felt; telescopic goggles; Sonicguide, a tiny navigational device, and many others.

The American Foundation for the Blind at 15 West 16th Street, New York, N.Y. 10011, describes these and other useful products in two publications: a descriptive pamphlet called "Aids for the 80's" and an order guide, "Products for People With Vision Problems." Single copies are free. The foundation also publishes a Catalogue of Publications, which lists printed materials, available through the foundation, that are pertinent to people with low vision.

Other useful organizations include the Vision Foundation, a self-help group that publishes in both large type and on cassette a handbook called "Coping With Sight Loss" (available for $10 from the foundation at 2 Mount Auburn Street, Watertown, Mass. 02172). The National Society to Prevent Blindness, 79 Madison Avenue, New York, N.Y. 10016, publishes material on preventing vision loss. To join the Talking Books Program, write to the National Library Service for the Blind and Physically Handicapped, Library of Congress, Washington, D.C. 20542.

The National Braille Association at 422 Clinton Avenue South, Rochester, N.Y. 14620, and Recording for the Blind Inc. at 20 Roselle Road, Princeton, N.J. 98540, can also provide access to the printed word.

Two consumer-based organizations that can also provide useful literature are the National Federation of the Blind, 1800 Johnson Street, Baltimore, Md. 21230, and the American Council of the Blind, 1211 Connecticut Avenue NW, Washington, D.C. 20036.

National Library Service for the Blind and Physically Handicapped
The Library of Congress

1291 Taylor Street NW
Washington, DC 20542
Telephone 202 287-5100
TWX 710-822-1969

SOURCES OF INFORMATION ABOUT VISUAL LOSS

American Council of the Blind
1155 15th Street, NW
Suite 720
Washington, DC 20005
(202) 467-5081
800-424-8666

A national membership organization providing legal, educational, consultative, and advisory services to individuals, agencies, and organizations. Includes state and special interest affiliates.

Principal publication: Braille Forum, monthly

American Foundation for the Blind
15 West 16th Street
New York, NY 10011
(212) 620-2000

Serves as a clearinghouse for information on visual impairments; publishes extensive material; sells consumer products.

Principal publications: Journal of Visual Impairment and Blindness, monthly
Catalogs listing consumer products and publications

American Printing House for the Blind
1839 Frankfort Avenue
Louisville, KY 40206
(502) 895-2405

Provides educational materials; conducts research related to the selection and preparation of literature and educational aids; sells consumer products.

Principal publications: The Slate, irregular
Catalogs listing braille and large-type publications and educational products

Association for Education and Rehabilitation of the Blind and Visually Impaired
206 North Washington Street
Suite 320
Alexandria, VA 22314
(703) 548-1884

A membership organization open to individuals and agencies who work for rehabilitation and education of visually impaired persons; provides a job exchange and employment information.

Principal publications: AER Report, monthly; Yearbook, annual

Association of Radio Reading Services
1010 Vermont Avenue, NW
Suite 1100
Washington, DC 20005
(202) 347-0955

Provides information about radio services available to print handicapped individuals throughout the United States. Includes data on public (noncommercial) radio stations that offer reading or information program services through open channel programming or through Subsidiary Communications Authorization, (SCA programming) requiring special radio receivers.

Blinded Veterans Association
1726 M Street, NW
Suite 800
Washington, DC 20036
(202) 223-3066

Assists blinded veterans in obtaining federal, state, and local benefits and general rehabilitation; works with employers and blinded veterans in obtaining jobs.

Principal publication: BVA Bulletin, bimonthly

Dialogue Publications, Inc.
3100 Oak Park Avenue
Berwyn, IL 60402
(312) 749-1908

Publishes a quarterly magazine with articles of special interest; has free cassette information on coping with visual loss.

Principal publication: Dialogue magazine, monthly

Hadley School for the Blind
700 Elm Street
Winnetka, IL 60093
(312) 446-8111
800-323-4238

Offers correspondence courses in both braille and recorded form to visually impaired and deaf/blind students and adults; Services are free and worldwide.

Principal publication: Student Information Bulletin, annual

National Association for Visually Handicapped
305 East 24th Street
New York, NY 10010
(212) 889-3141

Serves as an advocate for partially sighted persons, and as a national clearinghouse for information about services available to partially sighted individuals.

Principal publications: Seeing Clearly, irregular; catalog of consumer products

National Braille Association
422 Clinton Avenue, South
Rochester, NY 14620
(716) 232-7770

Includes volunteers who transcribe materials in braille; maintains a Reader-Transcriber Registry to provide blind readers with personal items helpful in work, recreation, and daily living.

Principal publication: NBA Bulletin, quarterly

National Eye Institute
National Institutes of Health
Bldg. 31, Room 6A03
Bethesda, MD 20205
(301) 496-5248

Provides facts about eye diseases, defects, and injuries; conducts and supports research related to the causes, prevention, diagnosis, and treatment of disorders of the eye and visual system.

Principal publications: fact sheets and brochures

National Federation of the Blind
1800 Johnson Street
Baltimore, MD 21230
(301) 659-9314
800-638-7518 (Job Opportunities)

A membership organization working toward the complete integration of blind persons into society; has state and local affiliates.

Principal publication: Braille Monitor, monthly

National Library Service for the Blind and Physically Handicapped
Library of Congress
1291 Taylor Street, NW
Washington, DC 20542
(202) 287-5100

Provides a free national library service of braille and recorded books and magazines to visually and physically handicapped persons through a network of cooperating regional and subregional libraries throughout the country.

Principal publications: Talking Book Topics, bimonthly; Braille Book Review, bimonthly; News, quarterly; Update, quarterly; catalogs, reference circulars

Recording for the Blind
20 Roszel Road
Princeton, NJ 08540
(609) 452-0606
800-221-4792/93

Provides cassette recorded educational materials on free loan to visually, physically, and preceptually handicapped students and professionals in the United States and abroad. Trained volunteers operating at twenty-eight recording studios located throughout the U.S. record several thousand titles annually.

Principal publications: Recording for the Blind Newsletter; semiannual catalog of recorded texts

RP Foundation Fighting Blindness
1401 Mt. Royal Avenue
4th Floor
Baltimore, MD 21217
(301) 225-9400
800-638-2300

Provides an information and referral service regarding the group of eye diseases known as retinal degenerations; funds research.

Telephone Pioneers of America
195 Broadway
Room C-1837
New York, NY 10007
(212) 393-2512

Includes active and retired senior telephone system employees who perform volunteer services including repair of talking book machines and the design of customized aids.

Vision Foundation
818 Mt. Auburn Street
Watertown, MA 02172
(617) 926-4232

Provides information, referrals, and self-help groups. Distributes materials in large type, braille, and recorded formats.
Principal publications: Coping with Sight Loss, a resource guide; Vision Inventory, a listing of materials; Vision Views, monthly

July 1987

Facts

National Library Service for the Blind and Physically Handicapped

The Library of Congress
Washington, D.C. 20542

February 1990

Magazine Sales to Overseas Organizations

Most braille and flexible-disc magazines produced for the National Library Service for the Blind and Physically Handicapped (NLS), Library of Congress, are available for purchase on a subscription basis to overseas agencies serving blind and physically handicapped patrons. This arrangement is made possible through the cooperation of publishers who have generously granted NLS permission to include their publications in the NLS overseas program. Magazines available for purchase by overseas agencies are shown on the attached list, categorized by medium.

Agencies wishing to obtain subscriptions to any magazine on the list are asked to write to Head, Network Services Section, National Library Service for the Blind and Physically Handicapped, Library of Congress, Washington, DC 20542, USA, indicating the magazines desired and the number of copies of each. Approved copies of requests are forwarded to the appropriate producer for action. The producer then contacts the requesting agency in regard to subscription costs, shipping arrangements, and any other necessary information. Shipping costs are in addition to subscription costs.

Agencies are reminded that braille magazines are produced according to Grade 2 English Braille, American Edition rules for transcription; flexible-disc magazines are recorded at 8-1/3 rpm and require the use of a phonograph with playback capability at this speed. Phonographs for this purpose are available for purchase from the American Printing House for the Blind (APH), 1839 Frankfort Avenue, Louisville, KY 40206, USA. APH should be contacted directly for a detailed description of this phonograph and the latest price quotation.

RESTRICTIONS

NLS approves subscription sales only to agencies using the materials for individuals who cannot use regular print materials because of a visual or physical disability.

Only one agency in a country will be approved to purchase subscriptions.

Purchase of a subscription does not include the right to duplicate additional copies of the magazine.

These restrictions conform with our agreement with publishers and the laws and regulations under which NLS operates.

PERIODICALS AVAILABLE FOR OVERSEAS SUBSCRIPTIONS

Flexible Disc (Recorded at 8-1/3 RPM)

American Heritage (bimonthly)
Analog (13 issues)
Atlantic (monthly)
Book World (weekly)
Buenhogar (biweekly)
Changing Times (monthly)
Consumer Reports (11 issues)
Ebony (monthly)
Ellery Queen's Mystery Magazine (13 issues)
Encore (bimonthly)
Farm Journal (14 issues)
New Choices (monthly)
Foreign Affairs (5 issues)
Good Housekeeping (monthly)
Harper's (monthly)
High Fidelity (monthly)
Musical America (monthly)
Historic Preservation (bimonthly)
Jack and Jill (8 issues)
(w/Ranger Rick's Nature Magazine)
Journal Francais d'Amerique (biweekly)
Journal of Counseling and Development (10 issues)
Money (monthly)
Nation (weekly, exc. biweekly in July and August)
National Geographic (weekly)
National Review (bimonthly)
Natural History (12 issues)
New York Times Large Type Weekly (weekly)
Outdoor Life (monthly)
Prevention: The Magazine for Better Health (monthly)
QST (monthly)
Ranger Rick's Nature Magazine (monthly) (w/Jack and Jill)
Social Work (bimonthly)
Sports Illustrated (weekly)
Travel/Holiday (monthly)
True West (monthly)
U.S. News and World Report (weekly)
Writer (monthly)

Braille

Better Homes and Gardens (monthly)
Book World (weekly)
Boy's Life (monthly)
Children's Digest (8 issues)
Consumers' Research (11 issues)
Fortune (biweekly)
Health (10 issues)
Horizon (monthly)
Isaac Asimov's Science Fiction Magazine (13 issues)
Jack and Jill (8 issues)
Journal of Rehabilitation (quarterly)
Ladies' Home Journal (monthly)
National Geographic (monthly)
New York Times Large Type Weekly (weekly)
Playboy (monthly)
Poetry (monthly)
Popular Mechanics (monthly)
Psychology Today (monthly)
Seventeen (monthly)

Facts

National Library Service
for the Blind and
Physically Handicapped

The Library of Congress
Washington, D.C. 20542

February 1990

International Interlibrary Loan

The National Library Service for the Blind and Physically Handicapped (NLS) of the Library of Congress lends recorded and braille books, music materials in special formats, and specific back issues of recorded and braille magazines to foreign libraries and agencies serving blind and physically handicapped individuals. NLS does not produce textbooks for students nor research materials for professionals, except for the music materials cited below; emphasis is on recreational reading material, mainly fiction and general nonfiction. United States federal law prevents the lending of books or machines directly to non-U.S. citizens living outside the United States. The loan of materials to foreign libraries is limited to titles needed by specific individual readers.

Braille books in the NLS collection are in standard Grade 2 English braille. NLS recorded books are on cassette (Philips cassettes, predominantly 4-track and 15/16 inches per second) and on disc (predominantly 8-1/3 revolutions per minute). Special playback equipment is needed to read these books because commercial equipment does not play at these slow speeds. NLS does not lend playback equipment to non-U.S. citizens living outside the U.S. nor to foreign libraries or agencies.

NLS music materials include instructional recordings and braille and large-print scores and books about music and musicians. The NLS Music Section will provide information about the availability of braille music internationally and will loan those scores not readily available from other sources. All music materials may be requested, except for those recordings purchased for the Music Section and available commercially in the United States.

Materials sent on international interlibrary loan may not be duplicated, because NLS has secured copyright permission with the understanding that reproductions are for the use of U.S. citizens and residents. Requests for books should be directed to the Network Services Section, and requests for music materials should be directed to the Music Section, National Library Service for the Blind and Physically Handicapped, Library of Congress, Washington, DC 20542, U.S.A. Interlibrary loan forms will be supplied upon request. Materials must be returned six weeks from the date of receipt.

Machines are available for purchase by libraries or agencies that serve eligible blind or physically handicapped individuals. For information on obtaining a special cassette player (which does not record), in quantity only, contact: Vice-President of Manufacturing, Telex Communications Inc., 9600 Aldrich Avenue, South Bloomington, MN 55420, U.S.A. For information concerning the personal purchase of a cassette recorder-player or a talking-book disc machine, contact the American Printing House for the Blind, P.O. Box 6085, Louisville, KY 40206, U.S.A.

BLINDNESS - BIBLIO.

American Foundation for the Blind

M.C. MIGEL MEMORIAL LIBRARY AND INFORMATION CENTER

15 West 16th Street, New York, N.Y. 10011 (212) 620-2000
TDD (212) 620-2158

BLINDNESS -- GENERAL

Selected References
Compiled by Leslie Rosen

Borrowing Policy: If you cannot locate any of the items on this bibliography in your local libraries, our policy is to lend four titles at a time, based on availabilty, for a one month period. Photocopies of periodical articles are available at 10 cents a page. Remittance must accompany all orders.

BOOKS

HV1626
B271
Barraga, Natalie C. VISUAL HANDICAPS AND LEARNING; A DEVELOPMENTAL APPROACH. Belmont, California: Wadsworth Publishing Co., 1976. 113p.

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Carrol, Thomas J. BLINDNESS: WHAT IT IS, WHAT IT DOES AND HOW TO LIVE WITH IT. Boston: Little, Brown and Company. 1961. 382p.

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Chevigny, Hector and Braverman, Sydell. THE ADJUSTMENT OF THE BLIND. New Haven: Yale University Press, 1950. 320p.

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M869
Cratty, Bryant J. MOVEMENT AND SPATIAL AWARENESS IN BLIND CHILDREN AND YOUTH. Springfield, Illinois: Charles C. Thomas, 1971. 240p.

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Cutsforth, Thomas D. THE BLIND IN SCHOOL AND SOCIETY; A PSYCHOLOGICAL STUDY. New York: American Foundation for the Blind, 1951. 269p.

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Farrell, Gabriel. THE STORY OF BLINDNESS. Cambridge: Harvard University Press, 1956. 270p.

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Faye, Eleanor E. and Hood, Clare M., eds. LOW VISION. Springfield, Illinois: Charles C. Thomas, 1975. 298p.

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Fraiberg, Selma (in collaboration with Louis Fraiberg). INSIGHTS FROM THE BLIND; COMPARATIVE STUDIES OF BLIND AND SIGHTED INFANTS. New York: Basic Books, 1977. 297p.

HV1618
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French, Richard S. FROM HOMER TO HELEN KELLER; A SOCIAL AND EDUCATIONAL STUDY OF THE BLIND. New York: American Foundation for the Blind, 1932. 298p.

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Goldberg, Maxwell H. and Swinton, John R. BLINDNESS RESEARCH: THE EXPANDING FRONTIERS. University Park: Pennsylvania State University Press, 1969. 544p.

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Halliday, Carol and Kurzhals, Ina W. STIMULATING ENVIRONMENTS FOR CHILDREN WHO ARE VISUALLY IMPAIRED. Springfield, Illinois: Charles C. Thomas, 1976. 142p.

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Hardy, Richard E. and Cull, John G., eds. SOCIAL AND REHABILITATION SERVICES FOR THE BLIND. Springfield, Illinois: Charles C. Thomas, 1972. 403p.

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Hoehne, Charles W.; Cull, John C. and Hardy, Richard E. OPHTHALMOLOGICAL CONSIDERATIONS IN THE REHABILITATION OF THE BLIND. Springfield, Illinois: Charles C. Thomas, 1980. 313p.

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Jan, James E., Freeman, Roger D. and Scott, Eileen P. VISUAL IMPAIRMENT IN CHILDREN AND ADOLESCENTS. New York: Grune and Stratton, 1977. 418p.

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Jose, Randall T., ed.. UNDERSTANDING LOW VISION. New York: American Foundation for the Blind, 1983. 555p.

HV1580
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Kirchner, Corinne. DATA ON BLINDNESS AND VISUAL IMPAIRMENT IN THE U.S.: A RESOURCE MANUAL ON CHARACTERISTICS, EDUCATION, EMPLOYMENT AND SERVICE DELIVERY. New York: American Foundation for the Blind, 1985. 315p.

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Kirtley, Donald D. THE PSYCHOLOGY OF BLINDNESS. Chicago, Illinois: Nelson-Hall Publishers, 1975. 312p.

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Koestler, Frances A. THE UNSEEN MINORITY; A SOCIAL HISTORY OF BLINDNESS IN THE UNITED STATES. New York: David McKay, 1976. 559p.

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Lowenfeld, Berthold; Abel, Georgie Lee and Hatlen, Philip H. BLIND CHILDREN LEARN TO READ. Springfield, Illinois: Charles C. Thomas, 1969. 185p.

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Lowenfeld, Berthold. THE CHANGING STATUS OF THE BLIND; FROM SEPARATION TO INTEGRATION. Springfield, Illinois: Charles C. Thomas, 1975. 336p.

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Lowenfeld, Berthold. BERTHOLD LOWENFELD ON BLINDNESS AND BLIND PEOPLE, SELECTED PAPERS. New York: American Foundation for the Blind, 1981. 245p.

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Lydon, William T. and McGraw, M. Loretta. CONCEPT DEVELOPMENT FOR VISUALLY HANDICAPPED CHILDREN; A RESOURCE GUIDE FOR TEACHERS AND OTHER PROFESSIONALS WORKING IN EDUCATIONAL SETTINGS. New York: American Foundation for the Blind, 1973. 69p.

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Mehr, Edwin B. and Freid, Allen N. LOW VISION CARE. Chicago, Illinois: Professional Press, 1975. 257p.

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Scott, Robert A. THE MAKING OF BLIND MEN; A STUDY OF ADULT SOCIALIZATION. New York: Russel Sage Foundation, 1969. 145p.

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Welsh, Richard L. and Blasch, Bruce B., eds. FOUNDATIONS OF ORIENTATION AND MOBILITY. New York: American Foundation for the Blind, 1980. 672p.

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Yeadon, Anne. LIVING WITH IMPAIRED VISION: AN INTRODUCTION. New York: American Foundation for the Blind, 1979. 75p.

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Zahl, Paul A., ed. BLINDNESS; MODERN APPROACHES TO THE UNSEEN ENVIRONMENT. New York: Hafner Publishing Company, 1962. 588p.

August, 1987

Facts

National Library Service for the Blind and Physically Handicapped

The Library of Congress

Washington, DC 20542

January 1990

Books for Blind and Physically Handicapped Individuals

From a beginning of 19 libraries, the network has expanded to 56 regional and 93 subregional libraries throughout the U.S.

A free national library program of braille and recorded materials for blind and physically handicapped persons is administered by the National Library Service for the Blind and Physically Handicapped (NLS), Library of Congress. With the cooperation of authors and publishers who grant permission to use copyrighted works, NLS selects and produces full-length books and magazines in braille and on recorded disc and cassette. Reading materials are distributed to a cooperating network of regional and subregional (local) libraries where they are circulated to eligible borrowers. Reading materials and playback machines are sent to borrowers and returned to libraries by postage-free mail. Established by an act of Congress in 1931 to serve blind adults, the program was expanded in 1952 to include children, in 1962 to provide music materials, and again in 1966 to include individuals with other physical impairments that prevent the reading of standard print.

About 73 percent of the NLS annual appropriation is budgeted for books, equipment, and related materials and 27 percent for support services.

Funding

The NLS program is funded annually by Congress. The fiscal year 1989 appropriation was $36,474,000. Regional and subregional libraries receive funding from state, local, and federal sources. The combined expenditure for the program is approximately $60,000,000.

Eligibility

Anyone who is unable to read or use standard printed materials as a result of temporary or permanent visual or physical limitations may receive service. A survey sponsored by NLS found that two million persons with some type of visual impairment may be eligible and another million with physical conditions such as paralysis, missing arms or hands, lack of muscle coordination, or prolonged weakness could benefit from the use of reading materials in recorded form.

More than 20 million recorded and braille books and magazines were circulated to a readership of 712,330 in 1989.

Book Collection

Books are selected on the basis of their appeal to a wide range of interests. Bestsellers, biographies, fiction, and how-to books are in great demand. Titles expected to be extremely popular are produced on flexible disc in several thousand copies and circulated to borrowers within several months of their publication in print form. A limited number of titles are produced in Spanish and other languages for readers whose primary language is not English. Registered borrowers learn of new books added to the collection through two bi-monthly publications, *Braille Book Review* and *Talking Book Topics*. Through a union catalog available on microfiche and in computerized form, every network library has access to the entire NLS book collection and to the resources of several cooperating agencies.

The national book collection currently contains 55,000 titles (12 million copies). The average reader borrows 34 recorded books and magazines a year. Braille readers also average 34 books and magazines a year.

Magazines

Almost seventy magazines on disc and in braille are offered through the program. Readers may request free subscriptions to *U.S. News and World Report, National Geographic, Consumer Reports, Good Housekeeping, Sports Illustrated, Jack and Jill,* and many other popular magazines. Current issues are mailed to readers at the same time the print issues appear, or shortly thereafter. Magazines are selected for the program in response to demonstrated reader interest.

A 4-track cassette recorded to play at 15/16 ips provides up to six hours of playing time. The average book consists of two cassettes.

Equipment and Accessories

Playback equipment is loaned free to readers for as long as recorded materials provided by NLS and its cooperating libraries are being borrowed. Talking-book machines are designed to play disc recorded books and magazines at 8 rpm and 16 rpm; cassette-book machines are designed for cassettes recorded at 15/16 ips and the standard speed of 1⅞ ips on 2 and 4 sides. Readers with very limited mobility may request a remote-control unit; hearing impaired readers may be eligible for an auxiliary amplifier for use with headphones. A cassette machine designed primarily for elderly persons is the newest equipment distributed.

The national music collection, the largest of its kind in the world, contains more than 30,000 items.

Music Services

Persons interested in music materials may receive them directly from the Music Section of NLS. The collection consists of scores in braille and large type; textbooks and books about music in braille, large type, and recorded format; elementary instruction for voice, piano, organ, guitar, recorder, accordion, banjo, and harmonica in recorded form.

Telephone Pioneers and other volunteers repaired 129,300 talking book and cassette machines in 1989.

Volunteer Services

Free correspondence courses leading to certification in braille transcribing (literary, music, and math braille) and braille proofreading are offered. Voice auditions and informal training are given to volunteer tape narrators affiliated with local recording groups. A directory of volunteer groups that produce books for libraries and individuals is published frequently. Volunteers may call on NLS staff for their expertise in braille transcription and recording techniques.

Information Services

Questions on various aspects of blindness and physical handicaps may be sent to NLS or to any network library. This service is available without charge to individuals, organizations, and libraries. A variety of publications of interest to handicapped persons and service providers are free on request.

Consumer Relations

The Consumer Relations Officer maintains regular contact with consumer groups and individual users of the program to identify and resolve service problems and to assure that users' needs are being met. Participating in surveys, evaluating new equipment, and serving on advisory committees are some of the ways in which consumers contribute to program development.

Production costs average five dollars for a cassette book and four dollars for a book on flexible disc.

Research and Development

The NLS research program is directed toward improving the quality of reading materials and related equipment, controlling program costs, and reducing the time required to deliver services to users. Current research activities include (1) the development of high-speed embossers for braille printing, (2) the application of digital techniques to NLS recorded material, and (3) the use of the latest advances in computer technology to provide automated communications links among NLS, all participating libraries, book and magazine producers, and distribution centers.

For Further Information

Ask your local public librarian for more information about the program and how to apply for service. To obtain publications, please use the attached, preaddressed form.

January 1990

Distribution of some publications categories is limited to two items per request

Please send a copy of the items checked to:

Name _____

Address _____

City _____ State _____ ZIP _____

General Information Brochures

☐ Children and Teens: Reading for Visually or Physically Handicapped Children and Teens
☐ Libros Parlantes; Libros en Braille (Spanish and English)
☐ Facts: Music for Blind and Physically Handicapped Individuals
☐ Facts: Sources for Purchase of Cassette Players Compatible with Recorded Materials Produced by the National Library Service (NLS)
☐ Reading Is for Everyone
☐ Reading with Low Vision
☐ Reference and Information Services
☐ Talking Books and Reading Disabilities
☐ Talking Books for Seniors
☐ That All May Read (recorded and print)
☐ Volunteer at Your Braille and Talking-Book Library

Applications for Free Library Services

Eligibility Requirements and Application Form ☐ Individual ☐ Institution
Requisitos para el Servicio y Solicitud de Servicios Bibliotecarios Gratuitos (Spanish language)
☐ Individuos

Magazines and Newsletters (Sample Copies)

☐ Braille Book Review; bimonthly (new braille books and program news)
☐ Musical Mainstream; quarterly (articles selected from print music magazines)
☐ News; quarterly (newsletter on current program developments)
☐ Talking Book Topics; bimonthly (new recorded books and program news)
☐ Update; quarterly (newsletter on volunteer activities)

Braille Information and Samples

☐ Alphabet Card
☐ Bookmark
☐ Braille Music Leaflet
☐ Facts about Braille

Directories

☐ Library Resources for the Blind and Physically Handicapped, 1989
☐ Regional and Subregional Libraries (addresses only), 1989
☐ Volunteers Who Produce Books, 1988

Reference Circulars (Information on Special Topics) **Limit of two items per request**

☐ Bibles, Other Scriptures, Liturgies, and Hymnals in Special Media, 1988
☐ Braille Instruction and Writing Equipment, 1986
☐ Building a Library Collection on Blindness and Physical Handicaps: Basic Materials and Resources, 1985

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- ☐ From School to Working Life: Resources and Services, 1985
- ☐ Guide to Spoken-Word Recordings: Foreign Language Literature and Instruction, 1988
- ☐ Guide to Spoken-Word Recordings: Popular Literature, 1987
- ☐ Information for Handicapped Travelers, 1987
- ☐ Learning Disabilities: Information and Advocacy Organizations, 1990
- ☐ Parents' Guide to the Development of Pre-School Handicapped Children: Resources and Services, 1984
- ☐ Reading Materials in Large Type, 1987
- ☐ Reading, Writing, and Other Communication Aids for Visually and Physically Handicapped Persons, 1986
- ☐ Reference Books in Special Media, 1982; Addendum, 1987
- ☐ Sources of Audiovisual Materials about Handicapping Conditions, 1985
- ☐ Sources of Braille Reading Materials, 1985
- ☐ Sports, Games, and Outdoor Recreation for Handicapped Persons, 1983

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Subject Bibliographies (Braille and Recorded Books) **Limit of two items per request**

- ☐ Bestsellers, 1979–1983
- ☐ Careers, 1989
- ☐ Discoveries: Fiction for the Youngest Reader, 1986
- ☐ Discoveries: Fiction for Elementary School Readers, 1986
- ☐ Discoveries: Fiction for Intermediate School Years, 1986
- ☐ Discoveries: Fiction for Young Teens, 1986
- ☐ Foreign Language Books, 1988
- ☐ Historical Fiction, 1983
- ☐ Humor, 1987
- ☐ Magazines in Special Media, 1988
- ☐ Mysteries, 1982
- ☐ Religion and Inspiration, 1987
- ☐ Romances, 1984
- ☐ Short Novels, 1985
- ☐ Short Stories, 1989
- ☐ Tactile Maps, 1987
- ☐ Westerns, 1983

Reference Bibliographies (Print Publications on Special Topics) **Limit of two items per request**

- ☐ Accessibility: Designing Buildings for the Needs of Handicapped Persons, 1983
- ☐ Attitudes toward Handicapped People, Past and Present, 1984
- ☐ Braille: History and Recent Developments, 1982
- ☐ Library and Information Services to Persons with Disabilities, 1989
- ☐ Mobility and Mobility Aids for Visually Handicapped Individuals, 1984
- ☐ Selected Readings for Parents of Preschool Handicapped Children, 1986

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Name _____

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Reference Section
National Library Service for the Blind
and Physically Handicapped
Library of Congress
Washington, DC 20542

Braille Literacy

ISSUES FOR BLIND PERSONS, FAMILIES, PROFESSIONALS, AND PRODUCERS OF BRAILLE

Susan J. Spungin, Ed.D.
Associate Executive Director for Program Services
American Foundation for the Blind

AFB American Foundation for the Blind

In 1889, people were judged literate if they could sign their names; that was enough for the farm and buggy economy. In the machine economy of 1939, literacy meant completing the sixth grade. Today, the information age of computers and high technology assumes for some a bare minimum of reading and writing skills at the high school graduate level. However, because changes in the workplace are so dramatic and unpredictable, many people must be ready to adapt to jobs that did not even exist when they were in school.

There are 25 million Americans who cannot read or write. An additional 45 million are functionally illiterate—without the reading and writing skills to find work—and that number is growing by more than 2 million a year.

Illiteracy is compounded by the attack on English as a national language, yet civilizations rise by literacy and a common language that allows knowledge to become accessible to all. Common values can be defined and pursued through a system of written communication. The Greek city state of the fifth century BC was the first that could be justly characterized as literate in this way. It gave us our concept on democracy and so much else of our Western culture.

"EDUCATION—MORE THAN COAL OR STEEL OR EVEN CAPITAL—IS THE KEY TO OUR ECONOMIC FUTURE."

The United States, above all, drew inspiration from that ancient tradition of liberty and knowledge. Yet, curiously, we also have an anti-intellectual tradition; we are resentful, in our egalitarian manner, of those who give the impression that they "know better." But in the postindustrial era, when the majority of people in the work force make a living with their minds, not their hands, it is education—more than coal or steel or even capital—that is the key to our economic future.

Dr. Matina Horner, president of Radcliffe College, recently stated, "I fear that as we approach the 21st century there is cause for alarm. Growing numbers of our population are at risk. We have recently been barraged by evidence and anecdotes documenting frightening illiteracy rates of many kinds (functional, mathematical, geographic) among our people." She asserted that our entire society is

threatened by the "vicious cycle of a growing illiterate underclass."

Unfortunately, it seems only natural that the problems of our total society are frequently the sum of its parts. Although I do not believe that the causes of braille illiteracy are necessarily based on the causes of the epidemic of illiteracy in the United States. In general, I do believe that our concerns over the lack of use of braille have been sensitized by the society's concerns in this area.

There clearly is a growing awareness and concern about the decrease in braille reading and writing in the United States both from consumers using the braille system and from providers of service who teach or produce materials in braille. This is not a new problem, but it is a growing one that can no longer be ignored. It appears to be an issue that consumers, teachers, and producers of braille agree exists but are divided as to why this situation has been allowed to develop and what to do about it. This article presents some of the common general reasons offered for the lack of braille usage, other more detailed reasons, that I believe are closer to the mark, and some possible solutions.

"WHY DO WE HAVE INCREASED NUMBERS OF ILLITERATE BLIND PEOPLE?"

Common Explanations

The most frequent explanations of why we have increased numbers of illiterate blind people seem to fall into one of eight categories:

1. Medical advances have saved many infants who previously would not have survived. This population of children who have been born blind and have other disabilities has diminished the number of potential braille users. These multiply handicapped children are estimated to be 50 percent of the total population of visually handicapped children with various degrees of disabling conditions, but there is no documentation of statistics, prevalence rates, or even demographics to support this suggestion. However, it is stated that this population is made up, for the most part, of nonreaders whose most frequent additional impairments are retardation and learning disabilities.

2. The work of Dr. Natalie Barraga and others in improving the use of residual vision in the 1970s

and 1980s has encouraged educators and parents to strive for visual utilization when possible, as opposed to the more historically common practice of teaching braille to all students, regardless of individual need or visual acuity. Consequently, there are fewer braille users.

3. Positive attitudes toward the use of braille have diminished, and potential braille users are given second-class status and attention.

4. University training programs for teachers of visually handicapped students have given lip service to teaching braille and have, over the years, graduated less-than-proficient braille instructors as teachers.

5. The complexity of the braille code causes illiteracy among blind students and should be changed in one way or another.

6. The dependence on audiotapes and speech-output devices has helped to minimize the perceived necessity for braille.

7. The existing service delivery models in schools serving blind children have, through the concept of the least restrictive environment found in P.L. 94-142, favored itinerant and teaching consulting models of service, thus limiting the time spent with students because of large caseloads and the geographic regions served.

8. The Individual Education Plan (IEP) process, mandated in P.L. 94-142, is not working and favors what is available in the school district where the blind child resides, rather than the needs of the child. This approach is often the result of professional rather than parental concerns, as well as critical shortages in teachers of the visually handicapped.

These eight areas are the most frequently cited explanations for the lack of braille usage. Although I agree with many of them, I believe they often miss the details that make up each of the eight categories.

"POSITIVE ATTITUDES TOWARD THE USE OF BRAILLE HAVE DIMINISHED, AND POTENTIAL BRAILLE USERS ARE GIVEN SECOND-CLASS STATUS AND ATTENTION."

More Detailed Explanations

1. There is no doubt that the multiply handicapped population has grown tremendously since the 1940s as a result of high levels of oxygen in incubators, which caused Retrolental Fibroplasia (RLF),

now known as Retinopathy of Prematurity (ROP), and in the 1950s and 1960s, with the rubella epidemic. However, children who are both visually impaired and multiply handicapped have been sold down the river.

When we wish to count and serve this population, as required by P.L. 94-142, we are told that their primary handicap is other than vision. Thus, they become lost to us and unserved or are underserved by others with no knowledge of the effects of visual impairment on sensory, motor, and cognitive development. Consequently, our numbers decline, along with our justification for funding programs and training teachers. Until we are ready to fight the growing generic model of service, this problem will increase and affect service in general to all children, whether they are multiply handicapped or visually handicapped.

"THIS BANDWAGON MENTALITY FOR THE QUICK FIX HAS SHORTCHANGED MANY VISUALLY HANDICAPPED CHILDREN AND ADULTS."

2. For too long, this country has been looking for a quick fix to solve problems bilaterally—yes or no, right or wrong, sighted or blind. I believe that Dr. Barraga and her colleagues never intended her work in vision stimulation and vision efficiency to be unilaterally applied to all visually handicapped children with some remaining sight. But that's what we did and still do, which suggests of course, to the system and to the children, that to see is better than not to see, and it encourages visually handicapped children to use their remaining vision at all costs.

This bandwagon mentality for the quick fix—to be more like sighted than like blind people—has shortchanged many visually handicapped children and adults in this country, who are to be added to the 25 million sighted Americans who cannot read or write. The pendulum has swung too far; it must be brought back and centered.

3. Negative attitudes toward blind people and the communication skills they need are indeed present and truly unintended; that's what makes them so insidious. Without perhaps realizing it, how we as educators of blind children and adults perform and interchange with our students/clients and other professionals shows blind people what our attitudes are toward them. By depriving blind students of the right to read braille over large print

when clearly they read at a less-than-functional speed with large print, is to deny them equal access to life. It can't help but suggest that perhaps braille is inferior and, therefore, reading print or having sight is superior. Do we positively reinforce a blind child to learn braille with the same enthusiasm we show them to learn print?

Another negative attitude is more a function of human frailities. That is, one does not often support an activity about which he or she is not fully knowledgeable. Therefore, if a teacher of the visually handicapped is not comfortable in the knowledge and teaching of braille codes, the necessity for doing so cannot help but be diminished.

4. The inadequate knowledge of braille by teachers of the visually handicapped is not all of their making. The attitude toward braille instruction at the university or college preparation level is uneven, to say the least. Some programs are truly strong and place equal emphasis on the acquisition of braille codes and the teaching of reading and mathematics that are intrinsic to imparting braille instruction in these areas. Others give the whole thing lip service, some believing it should be a prerequisite to college or graduate course work and others thinking that it requires only an independent or correspondence course type of approach to learning.

These views vary with the coordinators of the different preparation programs, some excellent and some not, some reducing braille instruction just to the level of a transcriber's knowledge and omitting anything specific to reading or the teaching of mathematics.

5. A recent rash of articles has attributed the illiteracy of blind persons to the complexity of the braille code. Moon type, Morse code, or whatever, revisited, only reminds me of the waste of the war of the dots.

Let's not fight that war again and revert to the belief that the braille code is archaic or too complex. A recent article stated that a blind honor student "couldn't read a novel or write a paper." This situation is, of course, inexcusable, but to say that the student's illiteracy is due to the complexity of the

"DO WE POSITIVELY REINFORCE A BLIND CHILD TO LEARN BRAILLE WITH THE SAME ENTHUSIASM WE SHOW THEM TO LEARN PRINT?"

braille code is unfounded. No research has supported the notion that the braille code, in and of itself, causes illiteracy among blind students and thereby limits the career opportunities that are available to them.

In fact, it is through braille reading that literacy is possible. The American Foundation for the Blind's Careers and Technology Information Bank (CTIB), which lists 1,000 different jobs held by blind and visually impaired people, indicates that 85 percent of those who use braille as their primary method of reading are employed.

6. The concerns that technology of any form will diminish the need for and use of braille go back to as early as the 1940s, with the beginning of the Talking Book program. This either/or attitude seems to have permeated the field of services to the blind. Throughout the years of technological development, ranging from Talking Books, records, cassettes, players and tapes, and computer and speech technology, I have never met a proficient braille user who has rejected braille because of these new communication skills.

"IN FACT, IT IS THROUGH BRAILLE READING THAT LITERACY IS POSSIBLE."

Most proficient braille users treat these advances in print accessibility as one of several options that are available to them and that complement each other. In fact, the ability to do word processing in braille, to edit braille text accurately, and to convert it to hard copy represents one of the most significant advances in communication available to blind persons in this century.The potential concern over competing technologies that will diminish the need for braille is, in my opinion, minimal when one considers the problems of locating and producing titles because of multiple listings in various organizations and the lack of a central source for the acquisition of information. The number of blind students who are waiting for braille texts in school is unconscionable. If we believe in equal access to print, in this case via braille, and now have the technology to accomplish it easily, why do braille users have to wait for and receive books halfway through the schoolyear. How many books are not done, and how many books are transcribed unknowingly more than once or twice? What type of statement does this make?

7. The issue of service delivery models and their effect on braille instruction is crucial. We have so encouraged the placement of visually handicapped children in schools in the community that many states have restricted the alternative of placement in residential schools, which have become schools primarily for multiply handicapped blind children. This would not be a problem if we also ensured that itinerant and consulting programs would have reasonable caseloads that permitted teachers who are trained in working with visually handicapped children to have the time to provide adequate services.

In more cases than not, we have promoted our outward appearance of a physical setting of a least restrictive environment with an academic program that represents the most restrictive environment. What we all need to do is to ensure the most enabling learning environment for visually handicapped students with appropriate teacher/student ratios according to individual needs rather, than administrative mandates. No child can learn anything from a teacher in any academic area who comes to a school only once a week.

8. The IEP process of P.L. 94-142 is indeed the most important part of this historic legislation, the Education of All Handicapped Children Act. It is the time when experts, parents, and, when appropriate, students come together to chart the academic course of the visually handicapped student for the year. This process is so critical that its application to all school-age children, handicapped or not, seems obvious. However, it falls short in that it relies on the following assumptions:

a. The IEP team is equally able and willing to assess the visually handicapped child's needs and plan a program accordingly.

b. All parents are committed to the process and work hand in hand with the school district and the professionals who work with their children.

c. The school district has the desire, access, and money to hire trained visually handicapped teachers and orientation and mobility instructors and to purchase any necessary books and equipment.

d. The IEP team and parents will work toward solving problems and use due process as a last re sort.

"ENSURE THE MOST ENABLING LEARNING ENVIRONMENT FOR VISUALLY HANDICAPPED STUDENTS WITH APPROPRIATE TEACHER/STUDENT RATIOS ACCORDING TO INDIVIDUAL NEEDS RATHER THAN ADMINISTRATIVE MANDATES."

e. All agree on the definition of appropriate education in the least restrictive environment.

Believe it or not, there are some situations in which these five points are in place and children and programs flourish. However, there are other instances in which limitations, not needs and expectations, shape the results. To ensure the efficiency of this process, consumers and providers of services must join forces to insist that trained teachers, who have taken more than the two to three courses required by some states for state certification, be present, along with informed parents. Together we need to recruit teachers from our respective friends and colleagues to ensure adequate personnel. There is indeed much to be done, but I believe it is doable.

Possible Solutions

"THE REAL VICTIMS ARE THE ONES WHO LOSE THE MOST: BLIND CHILDREN THEMSELVES."

The following are some possible solutions that attempt to take into account the various positions of the braille illiteracy issue and its causes. There are no winners in this controversy or simple answers. The real victims are the ones who lose the most: blind children themselves.

Of greatest concern in this issue is the definition of the visually handicapped children we serve and many multiply handicapped/visually handicapped we do not service but should serve. The most tragic error was made when we as a field agreed to primary versus secondary handicapped labels to define our population. We have lost children to the generic cracks found in the system that espouses the need for the development of unique programs for individuals.

The issues of economy of scale have sent the costs of service delivery sky rocketing, compounded by the loss of many children to other areas of disabilities—children who have been educationally crippled by generic services. We need to define what we mean by blind children and braille users and to develop appropriate reliable assessment measures that allow decisions to be made on the use of braille or print or both. Such areas as the working distance from the page, the portability of reading skills, reading rates and accuracy, visual fatigue, and the proper interpretation of the results of assessments all

lend themselves to objective measurement and could easily serve as a basis for a uniform assessment tool. Children who do not fit neatly into the categories of braille or print users deserve the option of learning both braille and print until they can make their own informed choice.

Instruction in the reading and writing of braille should be based on what we know about teaching reading and writing. Such instruction draws on linguistic analysis, the psychology of learning, an understanding of the complexities of the reading and writing processes and of the individual differences of learners, familiarity with evaluation and testing procedures, and so forth. When braille is the notation system to be used as an abstract representation of the meaning of words, symbols, numbers, and concepts agreed to by members of a culture-language community, the mastery of the braille code or codes as well as its internal logic, is required.

A good curriculum should start with all we know about teaching, reading, and writing. Its sequence derives from a sequential arrangement of learning modules for the teacher and the learner to measure progress against a clearly defined, quantitative set of sequential goals. Thus, the selection of materials and methodology can be made from any source that will help learners to move forward. Teachers would be free to use a series of readers, selected readings from magazines, books, newspapers, and computer-generated materials. Experience charts, shopping lists, diaries, recipe files, work-related materials, school-related materials, and much more could all be used with ease to increase competence, provide opportunities for drill, and enable students to incorporate braille into their personal lives from the outset.

Many good teachers do these things. However, this approach addresses the issue of the development versus the adaptation of materials. I believe we have faulted on the side of adaptation when we consistently adapted the basal reading and mathematics books from the sighted curricula for blind children. We need to balance these efforts with the development of curricula that are specific to the needs of braille readers.

"CHILDREN WHO DO NOT FIT NEATLY INTO THE CATEGORIES OF BRAILLE OR PRINT USERS DESERVE THE OPTION OF LEARNING BOTH BRAILLE AND PRINT UNTIL THEY CAN MAKE THEIR OWN INFORMED CHOICE."

To ensure high-quality braille instruction, national standards should be developed and applied, perhaps by the National Library Service for the Blind and Visually Handicapped (NLS), to provide a minimum level of competence in the knowledge of braille. The teaching of this skill should be required courses in the curriculum of teacher preparation programs. The use of slate and stylus must not be ignored either, and national standards for excellence could also be established for this skill.

"WE NEED TO REEVALUATE THE MODELS FOR DELIVERING SERVICES TO VISUALLY HANDICAPPED CHILDREN IN PUBLIC SCHOOLS AROUND THE COUNTRY AND DEMAND LOWER CASELOADS, AS WELL AS APPROPRIATELY TRAINED TEACHERS IN VISION AND OTHER RELATED AREAS."

To change the braille code in any major way is pointless and only confirms the lack of understanding of the braille system by the individuals who made such a suggestion. But we have not used the standard-setting body of the Braille Authority of North America (BANA) as much as we should to ensure that the braille code is adequate for the times in which we live. BANA has many subcommittees in literary, mathematics, music, and other codes. By ensuring that consumers and teachers are present on each of these committees, we can assess the reality of the need for any proposed changes.

We need to reevaluate the models for delivering services to visually handicapped children in public schools around the country and demand lower caseloads, as well as appropriately trained teachers in vision and other related areas. We will succeed in this effort only by ensuring that the IEP process works to guarantee the proper teaching not only of braille but of orientation and mobility, activities of daily living, and other skills. We have in place a potentially good system in P.L. 94-142. Let's commit ourselves to making it work for all visually handicapped students.

To legislate or mandate any system of human services always creates problems of interpretation, monitoring and funding. I believe we have seen the reality of this since 1977 when P.L. 94-142 was implemented. To create new legislation state-by-state to address the problems of the federal law seems redundant. Let's work together to guarantee that the meaning and spirit of P.L. 94-142 are implemented. We can do so if we use our respective influence together as one voice to demand that the individual rights of blind children be protected through read-

ing and writing, through independent travel, and through access to the written word.

The lack of a centralized source of information for the easy location of books in special formats for blind and visually handicapped persons in this day and age is incomprehensible. Despite the proliferation of database systems, the reading needs of blind and visually handicapped people rely, for the most part, on an informal system of literature search that is usually dependent on the help of sighted persons. However, agencies that serve the recreational and educational reading needs of visually impaired children and adults have now formed the Coalition for Information Access for Print Handicapped Readers (CIAPHR).The coalition is the product of the American Foundation for the Blind's Networking Task Force focusing on developing and implementing a computerized central listing system and to act as a conduit for networking.

"THE LACK OF A CENTRALIZED SOURCE OF INFORMATION FOR LOCATION OF BOOKS IN SPECIAL FORMATS IS INCOMPREHENSIBLE."

The Networking Task Force identified the following goals: 1) To identify all potential network contributors, such as agencies and organizations that produce, collect, and disseminate titles in braille, large print, and recording format; 2) To develop, produce, and distribute a directory identifying agencies that list their titles; 3) To recommend a system that will provide a national comprehensive listing of these titles; and 4) To develop and publish guidelines for listing these titles.

CIAPHR is comprised of the American Council of the Blind, American Foundation for the Blind,Inc., American Printing House for the Blind, Association of Instructional Resource Centers for the Visually Handicapped, Canadian National Institute for the Blind, Charles Crane Memorial Library University of British Columbia, National Braille Association, Inc., National Library of Canada, and Recording for the Blind, Inc.

CIAPHR's Mission Statement is a concise description of its aim:

> The Coalition for Information Access for Print-Handicapped Readers was formed to address the persistent problems related to the location of, and access to, reading materials for blind and visually impaired persons. CIAPHR is commit-

> ted to exploring the feasibility and means of developing a comprehensive listing system for all materials produced in braille, large print, and recorded form in North America. These recommendations will be presented to the major producers and disseminators for their joint consideration.

It is hoped that in time, with speech technology, blind persons themselves can access the system as well.

Fred Schroeder stated the need to know braille succinctly at a recent meeting:

> Braille has been proven time and time again to be the way to literacy for blind people. It can be produced more easily and more cheaply than ever before in history. With braille and the other skills of blindness, we as blind people can fulfill our potential and take our true place as contributing, participating, taxpaying members of society. To achieve this goal will take concerted and collective actions.

I, too, wish to achieve this goal, for braille is an assertion of equality between blind and sighted persons with respect to written communication. With one voice, I have no doubt that equality can become a reality.

Susan J. Spungin, Ed.D., associate executive director, Program Services, American Foundation for the Blind, 15 West 16th St., New York, NY 10011. This brochure is a revised version of a speech presented at the National Convention of the National Federation of the Blind, Denver, Colorado, July 1989.

AFB LITERACY PROGRAMS AND PROJECTS

The American Foundation for the Blind supports the nationwide campaign for a more literate United States in a variety of ways.

- Public education campaign to inform the public that literacy is an issue for blind and visually impaired Americans too.
- Charter and founding member of CIAPHR — Coalition for Information Access for Print-Handicapped Readers.
- Founding member of BANA — the Braille Authority of North America.
- Participation in development of national standards for teaching of braille reading and writing.
- Special issue of *Journal of Visual Impairment & Blindness* on braille literacy.
- STARS Program—blind and visually impaired teenagers newsletter project.
- Cooperation with American Library Association to have readers who are blind included in Reading is Fundamental and National Library Week events.
- Alexander Scourby Awards honoring contributions to reading for blind persons.
- Publications on braille reading and writing.
- Publications in large print and in regular size type easily read with low vision optical devices.
- Presentations by AFB professional staff on braille literacy.
- Promotion, development and evaluation of technology that can enhance literacy.

Literacy projects planned for the future include a traveling exhibit, research on teachers' and parents' perceptions of braille, hints on teaching braille reading and writing manual.

American Foundation for the Blind
15 West 16th Street, New York, NY 10011