

BRAILLE AUTOMATION NEWSLETTER

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edited by

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Editorial

The Braille Automation Newsletter has been created as a joint product of the International Research Information Service of the American Foundation for the Blind, New York, and the Warwick Research Unit for the Blind, University of Warwick, England, as an aid in communicating among that community of researchers and developers interested in applied research involving braille production with computer-assisted systems. For maximum usefulness, it ought to be read in conjunction with the Newsletter of the Visually Impaired Data Processors International (VIDPI), whose address is given below.* During the next two to three years, the Braille Automation Newsletter will be sent at no cost to the distribution list indicated on the last page herein. After that period of time has gone by, a decision will have to be made about the future of the Newsletter: whether it ought to become self-supporting through subscription, whether it ought to be combined with the VIDPI Newsletter, or whether some other means ought to be found to distribute the kinds of information we are to publish.

In view of its transient nature, therefore, some idea of the reasons why this Newsletter appears may be of interest. Experienced researchers in this area will remember that as far back as 1962, Robert W. Mann, John K. Dupress, and their colleagues at MIT called for an effort to be made to enhance the availability of braille. Their purpose was two-fold. The first was to achieve transfer of the availability of sophisticated technologies to aid in the process of making braille available in greater quantity, greater variety, and at lower cost. The second was to see whether by enhancing the availability of braille, and by deploying its use more widely, we could test the proposition that the apparent decline in braille use was due to declining interest in braille as a communication medium - or whether its use was declining because it was indeed not available in the quantity and

*Visually Impaired Data Processors International (VIDPI)
P.O. 844, Evergreen Park, Illinois 69642.

variety readers wanted, when they wanted it, and at a cost which made it possible for them to acquire it.

A small number of conferences followed in the intervening years, at which the technical means by which computers could assist in braille production were spelled out; and in which the difficulties in the braille code itself were elucidated that made automatic transcription difficult.

The outcome of the attention paid over the years to this area resulted in a rather curious situation. On the one hand, the research and systems technology community responded to the expressed need by inventing, developing, and refining ever more sophisticated means by which the availability of braille could be enhanced. On the other hand, understanding of what the technologists were about was minimal among the members of that community who would have to fund, and then find use for, the products of technological application. The result has been that many significant solutions to the difficulties in enhancing the availability of braille have lain waiting application and use. Some of these developments, reduced to written form, have been published in the pages of the AFB Research Bulletin, and in special reports and monographs issued at universities and research centres. Other developments have become known to only a small coterie of researchers and others with similar interests through private correspondence and personal visits. It is evident that this inefficient mode of information dissemination led to replication of activity, poor utilization of work already done, and incomplete understanding of the technicalities of the process of computer assisted braille transcription. This writer can also report his surprise, during the course of contacting several individuals regarding details of the AFB braille project reported later in this issue, at the enormous amount of thought that has gone wholly unreported to the larger community of persons interested in the research and development of automatic braille transcription.

This Newsletter, as we have already said, can only aid in the improvement of communication among the affected community of researchers and developers; unfortunately we cannot fund these developments! But we think that a Newsletter materially assisting the awareness of affected persons about current activities in this field, having a short delay before publication and distribution of the news to be reported, can serve more than one purpose. It may help to remind some workers that they are not alone(!). It may help in consolidating a concensus about what might comprise a comprehensive program of research and development in this area. It may help in indicating places in the world where special expertise exists. It may suggest collaborative links among the several countries in which work is under way. It may save the time of some workers who can obtain required packets of software and/or hardware from others. And so on. The main point to be made is that this publication is a product of you, the reader, and it exists to serve your interests. We stand ready to help you in the dissemination of information about your work, and no reasonable request toward that end will be ignored. Nor should you hesitate to tell us what you like and don't like about the format, style, or content; we are open to suggestions. If you are located in Europe, you may direct your letter to John M. Gill at Warwick University. If you are located elsewhere in the world, you may direct your letter to me.

Good luck in your work!

L.L. Clark

Discussion Paper on the Desirability of a Joint Research Project
on the Braille Code, Extending the use of Braille, and the
Improvement of Reading Skills

J.L. Douce and M.J. Tobin

This document is intended to stimulate discussion on the desirability of scientifically examining the case for a revision of the current system of braille contractions and abbreviations. It has been prepared jointly by the Research Centre for the Education of the Visually Handicapped (Dr. M.J. Tobin) and the Warwick Research Unit for the Blind (Prof. J.L. Douce). These two research groups are considering the joint project described, combining expertise in the problems of braille perception, teaching, learning and transcription.

If you have any comments, of a general or specific nature, please send them to Prof. J.L. Douce, Warwick Research Unit for the Blind, University of Warwick, Coventry CV4 7AL or Dr. M.J. Tobin, Research Centre for the Education of the Visually Handicapped, University of Birmingham, 50 Wellington Road, Edgbaston, Birmingham B15 2EP.

It is now twenty years ago that the last major re-appraisal of Standard English Braille was undertaken by the National Uniform Type Committee. That re-appraisal centred round the Lochhead and Lorimer study of the frequency values of all contractions in Grade 2 braille. Despite the highly practical proposals put forward by the authors, it is true to say that no significant changes emerged. Since that time, various developments have been under way, three of which seem especially pertinent.

(i) One of these can be described as a gathering, if rarely articulated, dissatisfaction with the difficulties, anomalies, and inconsistencies of Standard English Grade 2 Braille, particularly as they affect the learning of Braille by congenitally blind children of average and below average ability and by newly-blinded adults who have been ink-print readers before the onset of blindness.

(ii) Another has been a general concern with the improvement of reading efficiency among sighted readers, many of whom have received instruction in reading techniques that are claimed to increase reading speeds by factors of 2, 3, and 4. Inevitably this has aroused interest among teachers and readers of Braille, with the consequence that attempts have been made, notably in the United States, to transfer some of these techniques to the tactile reading situation. This interest has been given added impetus by investigations showing that Braille reading is, typically, something like two-thirds slower than ink-print reading.

(iii) The third, and apparently unrelated, development is the attention being given by scientists and technologists to the educational, vocational, and rehabilitation problems of the handicapped in general, and the blind in particular. Of specific relevance to this discussion is the engineer's concern with ways of increasing the accessibility to the blind of the growing mass of 'written' information (witness the design and use of reading machines such as the Optacon, Textobrilie, Stereotoner and the increasing quantity of transcription by computers).

It may be that the time is now opportune for looking at these three phenomena together in the hope that Braille may be made available to a much larger proportion of the blind and so that those already possessing some competence in it could increase their reading efficiency. More needs to be known about the cognitive, perceptual, and motor skills associated with 'rapid' reading, and about the motivational factors involved. But progress here will be less than optimal unless there is, as Lochhead and Lorimer put it, 'some pruning of dead wood' and some simplification of the governing rules of Standard English Grade 2 Braille. It seems probable that computer technology could facilitate the attaining of some of these objectives by 'generating' an alternative Braille system (with pre-specified 'space-saving' characteristics) that could then be put to experimental test to ascertain relative acceptability, average reading speeds, and ease of learning.

To undertake a thorough study of this subject, and to put forward conclusions with reasonable expectation that any proposals for change will be implemented, the following programme of work is envisaged:

- (i) A representative selection of textual material comprising sections of novels, textbooks, short documents and correspondence will be assembled. An analysis similar to that reported by Lochhead and Lorimer (1954) will be undertaken; the significant differences being that the analysis will be done from data in computer-readable form, and will consider a larger amount of material.
- (ii) A wide range of users and experts will be consulted for suggested revision.
- (iii) A statistical study will be undertaken on the effects of the proposed revisions, to assess their significance with regard to potential reduction in the number of rules and saving of space.
- (iv) Revisions showing promise will be evaluated in carefully designed experiments to test their effects on learning time, reading speed and acceptability.
- (v) Feedback from these experiments will be used to improve the proposals and refine the experiments, hopefully leading to definitive results backed by scientific evidence supporting, or refuting, the case for modifying Grade 2 Braille.

It would of course be possible to push ahead separately with the improving of reading efficiency and with the examination of ways of pruning/simplifying/up-dating the code. There is, however, much more to be said in favour of combining these two objectives within the framework of a single unified project. The endorsing of the desirability of such a programme

of research and development by braille readers, teachers, and braille producers is clearly a necessary pre-requisite, and this brief, introductory statement is intended to do no more than contribute to the start of the discussion.

The Delft Embosser

A.N. Westland

The first prototype of the "Delft" braille-lineprinter is ready and working. The first test runs were encouraging. The design speed of five lines per second has been reached, still producing braille of good quality (equal heights of the produced braille dots).

A second prototype is now under construction, using the same principle, but having fewer parts, printing one braille line in two cycles. The printing (embossing) speed should be the same five lines per second.

An article about the first prototype has been accepted for publication in Research Bulletin of the American Foundation for the Blind.

"Triformation Systems' Automatic Braille Translation Support Equipment"

R.J. Snipas

Triformation Systems, Inc. of Stuart, Florida, USA is currently manufacturing four Braille Terminal Printer devices which give the blind the capability of interacting with commercial computer systems and to participate in all phases of automated Braille translation.

There are two terminals which operate at teletype speed and emboss their output on paper tape. The BD-3 (Braille Device-3) is a read-only device which acts as a slave unit to a teletype or any other slow speed, keyboard terminal. The ISE-1 (Interactive Strip Embosser-1) adds a keyboard and modem to the BD-3 to become an independant, portable computer terminal. Both of the above mentioned products can be used for text preparation and to control Braille translation software systems.

The LED-1 (Line Embossing Device-1) which was prototyped and displayed several years ago has had many design changes and is currently in limited manufacturing. LED-1 is a character oriented terminal compatible with teletype systems. It can be used the same as our strip, paper tape devices with the added advantage of page format.

Triformation Systems' LED-120 (Line Embossing Device-120) is currently being used world-wide as an interactive computer terminal and as a peripheral printer for Braille translation systems. This device produces 40-character Braille lines on fan-fold, continuous Braille paper. Braille producers, for the most part, use the LED-120 as an off-line printer driven by a storage device such as paper tape or digital cassette. The one-hundred twenty characters per second maximum operating speed of the LED-120 allows for the embossing of a page of Braille text in about ten seconds. Recent revisions of this printer have improved its mechanical durability and electronic capabilities.

There is now a parallel interface for direct connection to the computer, increased buffer size to accommodate more and varied storage devices, and capability for switching input codes.

Two areas are being explored concerning the use of paper by the LED-120. The first is a coordinated effort by the present LED-120 users group to purchase the paper in quantity. This way the cost could be reduced by a factor of more than 50%.

The second possibility is to be able to produce inter-point Braille. Two approaches are being researched by Triformation Systems with the hope that some form of inter-pointing can be implemented with the LED-120 mechanical revisions. Triformations' page embossers now have the capability of producing Braille on paper ranging from standard, computer printer paper for throw-away Braille to standard Braille paper.

In 1973 Triformation Systems developed conversion electronics that translated the key strokes of a Brailist into a computer-readable code. When Braille text produced on a Perkins Braillewriter was also captured in digital form on a cassette, the text could be reproduced on the LED-120 at ten seconds per page. Due to its limited editing capability, the P.B.C.E. (Perkins Braille Control Electronics) system has not been widely used. However, due to the demand of Braille producers who want to automate their production but do not want to become involved with a computer system, we are in the process of redesigning the P.B.C.E. By using the most advanced technology in micro-digital-recorders and video display editing devices, we hope that the new P.B.C.E. will be a complete Braille production centre at a reasonable cost.

I hope in future articles to be able to give more details on not only our new Braille system but also other devices that I have mentioned and some that are still on the drawing board.

International Register of Research
on Blindness and Visual Impairment

The first section of the register contains the names, addresses and brief description of projects of those who are working in the natural, behavioural and technological sciences bearing on problems arising from visual impairment. This register does not include purely medical research, but it does aim to include research on the causes of blindness, work with extremely low vision patients, sight-restoration and management, and referral of patients who are undergoing deterioration of visual capacity.

The second section includes:

- (i) Abbreviations of the names and organisations concerned with research for the blind and visually impaired.
- (ii) Periodicals which sometimes include relevant articles with significant research content.
- (iii) Abstract journals, information services and data bases which claim to cover some, or all, of this field.
- (iv) Brief list of some standard reference books.

Copies of the register are £5.00 (or equivalent in other negotiable currencies) each, and can be obtained from Dr. J.M. Gill, Warwick Research Unit for the Blind, University of Warwick, Coventry CV4 7AL, England. Cheques, made payable to "The University of Warwick", should accompany the order.

A braille edition is also available; price on request.

Research Project on Braille Printing

H.J. Küppers

The government sponsored research project has been running for two years by a research group of the STIFTUNG REHABILITATION in Heidelberg, Germany. In cooperation with the University of Münster their braille translation programme was being utilized into braille book production. The on-line text input with text editing systems as well as the off-line use of text-automats has been explored. Considerable attention has been given to the use of compositors tape.

The reproduction of the computer output into braille books can be done by either fast braille line-printers or data-controlled zinc-sheet embossing machines. For this purpose a fast stereotyper has been developed with the project.

In addition to the computerised production of braille data, a braille text-automat with high level direction facilities is almost finished. This unit can be used by either blind or sighted transcribers. The purpose is to transcribe complicated text which can hardly be translated by the computer on data-storage.

A demonstration of the total system will be given at the beginning of April, 1976.

Current Research at the Perceptual Alternatives Laboratory

E. Foulke

The print-to-braille translation system makes use of a Data General computer, the Nova 800, with a 512k disc. The present system uses an on-line teletypewriter for input and an on-line Triformation LED-120 for the braille output. However off-line data preparation using punched paper tape is being considered, as well as controlling the LED-120 from a digital cassette.

Our computer translation program uses a look-up table, on disc, which consists of the 80,000 words in the Thorndike-Barnhart Dictionary. Each entry includes the instructions for contracting the word, if it is contractable, and the instructions for hyphenating the word, if it has more than one syllable. If a word is not found in the look-up table, it is simply rendered in Grade I, and if it happens to occur near the end of a braille line, no attempt is made to hyphenate it.

We have now created our file, and the system is, except for one minor problem, ready to put into operation. The minor problem to which I refer is the lack of operating funds. We have no money with which to pay an operator, and so we just sit around and admire a system which is capable of providing a service that we know people want, but which sits idle for lack of operating funds. Of course, we are exploring funding possibilities, but we have turned up nothing very promising yet.

AFB Autobraille Project

L.L. Clark

A perilously simple experiment has been undertaken by a small group of researchers located around New York to see whether new technologies can reduce both the cost and the labour of automatic transcription of braille by computer. Given an analogue of ink print text in machine-readable form, the question is: If a composite digital tape is created in which photocomposition codes are overlaid upon text material, and fed through a braille transcription system using DOTSYS III, to what extent will the resulting product diverge from the "perfect" braille produced by other methods? Obviously, if editing of the braille text can be accomplished on the video display of a small "intelligent terminal," and if formatting difficulties do not vitiate the product obtained by using the DOTSYS III transcription program, then we can foresee a way in which we can significantly reduce the labour and cost of transcribing braille. So far, we can report that a test text drawn from the ink print publication The New Outlook for the Blind has been selected; it was transferred to machine-readable form adding photocomposition codes, with the use of a Datapoint intelligent terminal; resulting in a digital cassette containing text and codes, and through the DOTSYS III system. Preliminary examination of the resulting braille appears very encouraging, although we are unwilling to say more than this before we have made a thorough analysis of the braille copy of the ink print text. Further details and results will be reported in the next Newsletter.

Members of the AFB project group are: L.L. Clark, E. Lang, F. Kalin, R. Snipas, and E. Kramer (see distribution list at the end of this Newsletter).

Some Thoughts on Future Braille Research

P.W.F. Coleman

This paper briefly specifies areas in which I feel research should be progressing. Some of them are being more or less successfully covered. Others either sparsely or not at all. I make no pretence that this paper exhausts the possibilities.

Braille and Software

Programmers of braille translators know well the need for revision and simplification of braille systems. This need should be coupled with research into the factors influencing braille reading speed and comprehension, and the effects on these factors of braille revisions already carried out. Another factor (which is receiving attention at Warwick) relates revision to commonly occurring words and word components in literature of different types.

Not unrelated to this is the work going on to formally define braille systems, with the initial efforts towards producing metalanguages with which to do this. Problems encountered in the search for a metalanguage are special casing, syllabication and hyphenation.

If a formal definition can be made, programming translators become straightforward. In addition, anomalies in the grammar of braille are thrown into relief. Finally, the concept of a program to generate translation programs for different braille systems becomes tenable.

There is a need to standardise internationally braille systems for different disciplines, e.g. mathematics, music and science, for the sake of the blind with a need to read books in their field from different countries. On this score musicians seem to be succeeding at least to some extent where others have failed.

I believe there is both a mathematical and psychological problem in producing a linear (braille) notation from a non-linear (print) one, as is the case with mathematics. The braille notations are very clumsy, and make for difficulty in translation from the thoughts forms of the sighted mathematician to those of the blind one. There is scope for methodical research with the aim of producing an optimum and open-ended international braille mathematics standard.

Another optimisation field is that of tables and diagrams, including maps. With the notable exception of mobility maps, little or no work has been done to find the best ways to present these in braille, and to write programs to automatically reproduce them in the right format.

Braille Production Software

There is a need to lay down the minimum requirements for a quantity braille production system. Recent events in Britain suggest that one component of this system easily overlooked is the proof-correction cycle. It is not sufficient to verify data after input and assume that (a) input is perfectly correct, and therefore that (b) translation will be correct.

Verification can still miss errors, which may then be highlighted during the translation phase; and of course translation itself is most unlikely to be acceptable at the first shot.

There should be greater emphasis on online editing at each stage of the production cycle: for verifying input and proofing translation text (the latter easing special casing and hyphenation problems); and for formatting translated text before printing.

At this point I note that there is no agreed international (or even national) standard for dealing with hierarchies of headings and subheadings. For instance, it ought to be standard to include the current printed book page number in the

heading line on each braille page. Creating a standard for heading hierarchies ought surely to be a trivial task, not really requiring the time and thought of researchers!

Hardware Considerations

There is a great need for a satisfactory bulk braille printing device, possibly some such as the Horvath drum embosser, but in any case which does not use plates as an intermediary; with the growing need for metals and coming exhaustion of primary sources of ore, the price of metal for plates will continue to rise prohibitively.

Certain grades of paper have doubled in price in each of the last two years, and may well repeat this process in 1976. Plastics are also undergoing quite dramatic increases, due mainly to those in the price of oil.

It is time that all these price increases were brought realistically to the attention of the blind consumer, together with the need and possibility of a transient braille output device, e.g., the Argonne Braille Machine. In years to come, such a device might well be linked to an automatic print recognition system, enabling the blind to use normal printed books and still read in braille, and obsoleting the need for a lot of today's braille publication. Research could usefully determine the material that will always be needed in page format.

Meanwhile, for specialised or small volume runs, volunteer transcribing is still used, but volunteers are becoming scarce. There is a need to avoid, if possible, the training cycle - this is not, of course, a new need. A transcription system based on a microprocessor, portable and cheap, would broaden immediately the base from which transcribers could be taken to anyone with reasonable typing ability. Before such a device were designed, there would have to be a study made of the trade off between development and use of such a system, and volunteers being given a terminal for use with a remote machine.

It may be (I believe it is already true) that appropriate cheap key-to-cassette devices already exist which, although no translation would be done at the input stage, could provide a system for acquiring bulk data for braille cheaply; final editing and translation would occur at a central site with a braille expert present.

Work is needed on a cheaper method of duplicating braille than the Thermoform device. One solution is for a device which senses dot positions to communicate this information to an embosser, resulting in a dot-for-dot copy. Work already done in this field in Britain was discontinued because of creases on the master copy creating "virtual" dots across the output copy. But if the master were crease-free, as it could be if created and copied by the same person, this would be no problem.

A development from the above might be computer input from braille (CIB), in which the above input device communicates to a computer program which translates dot positions into braille characters and stores them as such. Diagrams might also be prepared in this way.* The device could be, I think, a desk-top terminal, very useful to blind programmers and engineers, but also in the computerised preparation of braille literature.

With material stored in the system as braille characters, one can envisage the need for a braille-to-print translation program; this would be used either for communicating with seeing colleagues, or for using a braille file as input to a compiler for a programming language. The task is not necessarily the exact converse of a print-to-braille translation program - one intuitively feels that it is not so exacting.

There is probably sufficient work on computer terminals at present, but there is a distressing tendency for such work not to come to fruition, so a careful watch on the situation

* with photoelectric sensing, directly from an ordinary line drawing.

is needed. Both price and servicing have in the past created problems, and future devices of whatever price must be fully supported in the field.

Already blind engineers are encountering difficulties because of the absence of a tactile graphics terminal; (it is depressing that I predicted this in "Computer Terminals for the Blind", Electronics and Power, March 1972, but first given at a seminar in 1970 of the British Computer Association of the Blind - no-one, it seems, took me seriously). This need is also being felt now by blind programmers, and high priority should be given to a tactile graphical display unit.

The earlier talk on braille production suggests the possibility and need for an integrated information system for the blind, at a small price which all can afford, and both portable and easy to use by those having no technical ability. Based on a microprocessor, the device would have both input and output in either braille or speech (not both). The braille version, I suggest, would have a braille keyboard and transient output. (I am designing such a device using no moving parts, apart possibly for the braille display; the main delay will be the development of sufficiently cheap IC storage devices).

Finally, may I mention the need for a portable brailier which is cheap, reliable, and above all silent, and preferably producing braille on both sides of the paper.

General Note on Price

There seems to be a misconception among researchers that there is no need for devices to be cheap. "After all," runs the argument, "being blind, the user does not require a car, nor expenses like a television." It only has to be stated for its folly to be seen, in the context of a fully integrated blind person.

His family wish to have both the car and television that their neighbours have. Blind people do, of course, watch television. Their need for a car is probably much more than

their seeing counterparts, due to difficulties on public transport and bulky apparatus to transport.

Before he starts work on a device, as an integral part of his initial feasibility study, the researcher must take account of this, and not proceed until either he can tailor the device to the pockets of someone already paying through the nose for additional aids, or be sure that finance is forthcoming from elsewhere.

I add this note because, I am sure, this has been the downfall of many a good idea!

National Computing Conference 1976

NCC '76 is being held in the New York Coliseum from 7th - 10th June. There are four sessions of specific interest:

"Computer Terminology Signs for the Deaf"

"Computerised Braille Translation"

"Communication Aids for the Non-Oral"

"Print to Synthetic Speech Reading Machines for the Blind"

Further details of the sessions relating to the visually handicapped can be obtained from R.A.J. Gildea, MITRE Corporation, 433 North Circle Drive, Colorado Springs, Colorado 80909, U.S.A.

This conference may be followed by a workshop on computerised braille but the arrangements have not been finalised. Information on this workshop will be circulated as soon as it becomes available.

Publications and Reports

American Printing House for the Blind "Computer Assisted Translation of Braille Music".

June 1972, July 1973, Dec. 1974, March 1975, June 1975 and Sept. 1975. Copies available from R.H. Evensen, Division for the Blind and Physically Handicapped, Library of Congress, 1291 Taylor Street N.W., Washington D.C. 20542, USA.

These progress reports describe a project for the computer production of braille music with a maximum level complexity of multivoiced music on a single staff.

Coleman P.W.F. "The Search for a Braille Translation Program".

Computer Weekly, 14th August 1975, p. 6.

Coleman P.W.F. "Braille Programs - Part 2: Defining the Language".

Computer Weekly, 21st August, 1975, p. 6.

Douce J.L. "Some Development in Computer-Aided Information Services for the Blind".

Chairman's address to the Control and Automation Division of the Institution of Electrical Engineers on 7th October 1975. Proceedings of the Institution of Electrical Engineers, Vol. 123, No. 1, Jan. 1976, pp. 93-97.

This paper reviews current work on the translation of braille text, music, maps and diagrams. The paper is aimed at scientists and engineers with no previous knowledge of braille or the blind.

Gill J.M. "Non-Visual Computer Peripherals".

Research Bulletin of the American Foundation for the Blind, No. 29, pp. 197-212.

A very brief factual survey of audio and tactual output devices which are either available or under development.

Gill J.M. et alii "Design and Evaluation of a System for the Production of Short Documents in Contracted Braille".

Warwick Research Unit for the Blind, 1975, 184 pp. A few copies are still available from Dr. Gill.

This report describes in detail the first year of operation of a computer-based system. The report includes listings of two versions of DOTSYS III - one in Fortran IV and one in Fortran IV with some Macrosymbol. The latter version uses 13k words of store, with initialisation overlaid, and translates at 5000 words per minute to a good approximation to grade II standard English braille. The report also includes the initial reaction of the users of this system.

Gill J.M. "The Automated Production of Bank Statements in Braille".

Warwick Research Unit for the Blind, December 1975, 85 pp. A few copies are still available from Dr. J.M. Gill.

This report describes in detail a system for producing bank statements in braille from digital tapes supplied by the banks. The report includes listings of the Fortran IV programs to convert from the banks' print-image format to the braille format.

Grootenhuis J. "Automated Braille Production from Composer's Tapes".

December 1974. Copies available from Drs. J. Grootenhuis, Nederlandsche Blindenbibliotheek, Noordwal 7, Den Haag, The Netherlands.

This 35 page report describes recent work at the Dutch Library for the Blind on the utilisation of punched paper tapes used by printers.

Lawes W.F. "The Feasibility Study into the Usage of Computers by and for the Blind".

January 1975. Copies available from E.J. Venn, Royal National Institute for the Blind, 224 Great Portland Street, London W1N 6AA, England.

This report describes Mr. Lawes's six month study on computerised braille translation. It briefly describes the state-of-the-art and makes precise recommendations regarding the implementation of a computer-based braille production system. Anybody setting up a new system is strongly recommended to read this report.

Patrick P.H. & Friedman P. "Computer Printing of Braille Music using the IML-MIR System".

Computers and the Humanities, to be published. Copies available from Prof. P.H. Patrick, Department of Music, College of Arts and Sciences, The American University, Washington D.C. 20016, USA.

This paper describes a computer-assisted system for producing braille music which does not have more than one note at the same time on a single staff.

CIRCULATION LIST

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