TVOntario

REPORT ON

TVONTARIO/DEPARTMENT OF COMMUNICATIONS

FIELD TRIAL FOR 1981-82: TELIDON AND EDUCATION
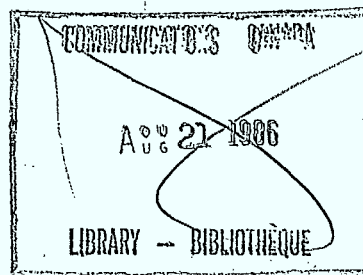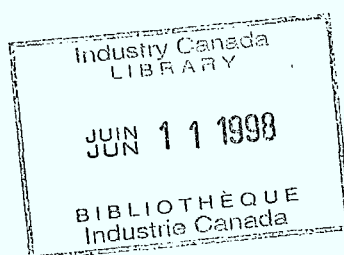
Submitted to the Department of Communications

by the Ontario Educational Communications Authority,

March 31, 1982

Contract Serial No. OER 81-05105
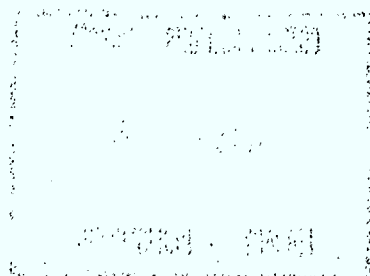
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2. Objectives

2.1 Operational Systems

2.11 Data base development and co-ordination of information Provider activity:

The premise on which the data bases are structured is that the participating educational agencies have particular objectives and learning environments that can be served well only by those agencies creating Telidon applications related to their specific needs. In addition to creating data base sequences structured to meet its own objectives, the OECA undertakes to assist other members of the consortium of information providers to design and input their applications. The process will include demonstrating (modelling) applications, supplying print materials and computer supplies, giving workshops, booking facilities, consulting, and providing follow-up services necessary to the loading of the data bases.

Database materials recorded on floppy discs will be forwarded to the operators of the CRC database for loading using the tree structure already assigned. The vast majority of the pages forwarded to CRC will be modified to accord with the tree structure and key-pad requirements of the VISTA database and will be forwarded to the VISTA database operators for residence on their host computer.

Concomitantly, other Telidon pages will be produced and recorded on floppy disc, then loaded into the teletext host at TVO's project centre, together with database materials drawn from on-line sources and modified to suit the requirements of the broadcast cycle of pages.

2.12 As an extension of its database development activity, the OECA will co-ordinate the production of 1000 Telidon pages in the French language.

2.13 Study of operational efficiency, programming systems

With especial reference to teletext, the OECA will field-test the systems supplied, and will report findings on the processing of the data bases to be utilized in the field trial, the functionality of related communications software, the organization of procedures for programming the teletext service, the channelling of up-dating information derived from a variety of information providers, and presentational factors.

2.14 Assessment of utility of teletext service/program

The OECA undertakes to present a range of information, both educational and general, including coping information and referrals to information on government services, cultural opportunities, and career development. It proposes to examine the utility of such information for a range of possible users.

2.15 Monitoring of reliability of on-line transmissions

The over-all reliability of the on-line system being dependent on the individual and collective performance of the user terminal, the data line, and the host computer, the OECA undertakes to monitor on a continuing basis and to report its findings on the performance of these elements as observed in operation. It will provide recommendations to the DOC on how reliability might be improved with specific reference to:

- keypad or keyboard
- decoder
- monitor
- modem or coupler
- data line
- operation of host computer

2.16 Utilization support:

The OECA undertakes to deploy the user terminals and to service them within the limits of its resources and authorization. As another aspect of utilization support, the OECA will design indexes calculated to meet the requirements of educators and students for ready access to selected data base content, access keyed to the frame of reference of the user. Conscious of the many variables contributing to the ease of difficulty of operation of the user terminals, the OECA will provide an updated manual covering many facets of the terminal's operation.

2.17 Evaluation:

The participants in the field trial will be asked to submit reports on the operation of the technology as observed in use, and to share in a process of assessment of the utility of the data base materials within particular educational contexts. These reports will be summarized.

2.18 Promotion

The OECA will give Telidon demonstrations in association with the Telidon and Education field trial, and will collaborate with the Department of Communications in supporting demonstrations of wider relevance.

2.2 Systems Development

2.21 The OECA will refine the physiology of the ASCII sources interface in furtherance of the goal of supplying current information via teletext.

2.22 The OECA will collaborate with and supply feedback to Cableshare and the CRC for the refinement of inserter systems, by monitoring and conducting tests on the operation of the systems supplied.

2.23 Study of broadcast transmission

The OECA will collaborate with the CRC as agreed, in the study of transmission characteristics.

2.24 The OECA will contribute to improvements in the Cableshare software that will assist the operators to provide more efficient operation.

2.25 If a fully-operating front-end component capable of receiving and processing Broadcast News for teletext display is not provided, the OECA undertakes to contribute to the adaptation of the Baudot interface developed for the CRC database so that a teletext interface can be implemented.

2.26 The OECA undertakes to apply and test one or more decoders fitted with memory extension board and capable of down loading via broadcast transmission, as supplied by DOC.

2.27 Similarly, OECA undertakes to apply and test a minimum 5 Electrohome integrated videotex terminals augmented to be able to display teletext, as supplied by DOC.

2.3 Public Service Database Content

2.31 The OECA undertakes to produce 500 Telidon pages of content to meet public service objectives, including some developed anew and some that are Telidon adaptations of existing database materials.

3. <u>Executive Summary</u>

This report describes the activities and draws inferences related
to the third year of the Telidon and Education field trial conducted
by TVOntario in association with the Department of Communications,
Ottawa. The first year of the field trial laid a foundation. The
second year put together the elements of an operational Telidon
system. The third year consolidated these elements to a point where,
for the first time a prototypical service was available to users,
and where educational applications could be assessed.

The objectives that the year's activities were designed to achieve
included videotex database development, broadcast-mode database
development, systems operation, technical studies, field support,
promotion, evaluation, and systems development. This set of objectives
was in fulfilment of two major goals. One of these was to test the
components of combined broadcast and wired-network Telidon systems
and to contribute to the understanding and improvement of such systems.
The other was to apply these systems in an educational context, and
to establish the extent of their utility and marketability in the
education sector. As a sub-set of the latter goal, the field trial
presented an opportunity for TVOntario to address the issue of whether
an educaitonal Telidon service should be added to its existing services,
and if so, what form that service should take.

The survey of activities undertaken begins with videotex database
development. Using four IPS second-generation page creation terminals,
TVOntario co-ordinated the production of over 6000 videotex pages

during the year. Of these, 500 are in French and a further 500 French-language pages are in process of production. Besides the materials developed by the project team, applications reflect the purposes of information providers drawn from elementary and secondary schools, colleges, universities, public libraries, and special service agencies.

By contrast, the development of broadcast Telidon database materials was undertaken almost exclusively by the project team. A cycle of pages was broadcast throughout the year, but because of the limitations of the technical systems available, the cycle did not expand to 100 pages or more on a regular basis until the advent of the Norpak TES (Encoder/ Inserter system) in December. The challenge addressed from that point on, was the programming of the cycle to reflect a diversity of sources and currency of information. The Report describes the approach taken, and the content transmitted.

The section of the Report dealing with technical system operation (videotex mode) draws particular attention to the constraints presented by existing carriage (wired-network) systems. Problems of carriage cost and difficulty of access are perceived as depressants on the economic and convenient use of videotex systems. The availability this year of Datapac represented an important step in the direction of lower cost and ease of access.

In the section dealing with technical system operation in the broadcast mode, special emphasis is given to the information interface assembled

by the project team. The hardware/software configuration developed this year permits the efficient gathering of information from remote sources, and ease of editing and conversion to Telidon format. This interface, which handles news, weather, and other information feeds, is presented as a practical demonstration of the need for semi-automated techniques for handling the large flow of up-datable information required for a teletext service.

The development of database materials and the improvement of facilities came together with the deployment of Mark III user terminals in the Fall of 1981 to form a more comprehensive foundation for utilization of service on the part of participating schools, post-secondary institutions and other agencies. Accordingly, additional personnel were assigned to field support, including consultation, and to evaluation procedures. The Report describes the nature of these activities.

As had been the case in the second year of the field trial, the call for information and for involvement in other activity broadly defined as Telidon promotion was as persistent and remained at as high a level as in the early developmental stages of the project. Under the co-ordination of the Manager, Liaison, the project team again gave presentations and demonstrations far and near, participated in professional/technical deliberations, wrote papers, disseminated literature, and communicated endlessly by telephone.

In the course of activities undertaken to make facilities fully operational, the project team found it necessary to modify system software or to devise novel software/hardware configurations. Not all

of these are "exportable" for use by other operators, but a comprehensive account is given, so that the reader can gain some appreciation of the significance of such activity and of its level.

Finally, a short survey is included focussing on the study of broadcast transmission of Telidon. The point is made that without more instrumentation, the study has perforce been comprehensive and informal rather than systematic and scientific. Nevertheless, observations made do point the direction that further action must take.

Appended to most of the chapters in this Report are a set of inferences drawn by members of the project team. These are for the most part specific to the topic dealt with in each chapter. It is possible, however, to draw some broad conclusions from the experience of the past year. They are presented here.

(1) The potential and marketability of broadcast Telidon services continue to emerge in ever sharper focus, but they are critically dependent upon the further and rapid evolution of system components. Problems of transmission in variable circumstances need addressing urgently.

(2) The concept of down-loading via broadcast is important to the realization of the full potential of the medium, and deserves to be supported at the levels of policy and funding.

(3) The potential for education of Telidon in the wired (videotex) mode is a supportable inference, butthe widespread use of videotex in education is dependent upon further evolution of technical system infrastructure, not to mention database development.

(4) The association, and indeed, combination of broadcast and wired-network modes makes both modes more attractive as educational media, -- more economic, and more responsive to educational needs and circumstances.

(5) The utilization of Telidon media in a particular educational environment, like the utilization of other media, can only be achieved through a process of design of learning systems that organically interrelate technical and pedagogical elements. The process, affecting both technical and utilization design, deserves and requires further support/funding. It is contended that the proposals made in January for an extension of field trial activities form a useful part of the process.

(6) Assuming that appropriate modifications to dual decoders can be incorporated in new hardware this year, and that adequate funding can be identified, it is recommended that in the coming academic year, TVOntario in association with ministries of the provincial government, deploy the components of a Telidon system capable of offering a limited but functional service to educational and youth agencies in the province of Ontario.

(7) Recognizing that further evolution/development of broadcast and wired-mode Telidon systems is required for effective application in educational environments, it is recommended that ways be explored to continue the collaboration between TVOntario and the Department of Communications already given concrete expression in the field trial.

4. Background to the 1981-82 Report

As this is written, the TVOntario Telidon and Education
project team is approaching the end of the third year of
the joint TVO/DOC field trial. During these three years, the
project moved from an initial phase of development, to a phase
of system implementation, and finally, to the stage of full
system operation and evaluation of applications.

By the end of the second year, the project team was able to
make a great many recommendations bearing on specific
components of the technical systems -- both broadcast and
wired -- and on the further development of the over-all system.
During the year now closing, we were able to act on a number
of these recommendations, and we are in a position in this
report to draw additional inferences as to the feasibility of
a number of operations deemed important to the delivery of an
efficient and economic Telidon service to educational
institutions and other users.

At the risk of our repeating old information, the reader is
reminded that the TVOntario field trial has been "dual". That is,
it is the only field trial in Canada that has been operating a
broadcast Telidon system, but it has also been operating a phone-
linked system running parallel with the broadcast service. Indeed,
from the beginning it has been the intent of the project to associate
these two modes, and to examine their optimal interrelationships.

As the project began, the Department of Communications was in a position to supply the essentials of a wired videotex system, but the evolution of a broadcast system lagged considerably behind. Fortunately, the Communications Research Centre had been at work developing a simple prototype encoder/inserter, and in January of 1980 the project was able to mount a demonstration broadcast cycle of approximately 25 pages, transmitting at 3.9 megabits per second. In due course, retrofitted Mark I dual terminals were supplied, and it became possible for some users to switch their decoder reasonably comfortably between broadcast and wired databases.

Meanwhile, a contract issued to Cableshare Ltd. by D.O.C. was under fulfilment to develop a much more sophisticated and serviceable broadcast system. Further evolved on site at some length during much of 1981, the system was put into regular operation in late summer. By this time, it became necessary to commence implementation of the decision to move to the Norpak TES system operating at 4.6 megabits, and linked to Mark III user terminals built to receive at that bit rate. It is that system which is now delivering 100 pages of updated information each day across the TVOntario network that reaches 86% of the people of Ontario by microwave, off-air, relay stations, UHF, VHF, and satellite.

5. Database Development: Videotex

    5.1 System Components

IPS Units

In the development of database content, the number, reliability
and version of the IPS units available to page creators is a
significant factor. At the beginning of the project year,
there was on site, two IPSO units, and one IPS1. Each unit
received upgrade kits, to enable them to operate with the
new picture editor commands (scaling, rotation, etc.) and text
editor facilities. Of the three, only the IPS1 could communicate
with a graphics tablet; of the other two units, one chronically
needed repair and was set aside for spare parts. Fortunately,
midway through the year, the project received two version 2 IPS
units -- one via DOC, and one on loan from Bell as part of their
field trial, each supplemented with a graphics tablet. With the
advent of the version 2 units, utilization of the mini-database
software was possible, and keypads were connected to these units.
This has been a boon in the structural design and editing
process of page creation.

Additional Equipment

The ability to record pages from an IPS unit onto a Hemton decoder
enabled project personnel to test out design techniques (the wait
function utility, the use of overlays) without having to wait until
content was loaded into a host computer. Given the differences in
rate of display between IPS units and user terminals, this has
proven quite useful in terms of planning.

The acquisition of a stand-alone microprocessor with a high capacity hard disc drive also aided in videotex production. Although predominantly used to remote capture content for broadcast use, the unit has also proven valuable as a fast, efficient tool for headering all content sent to the two host computers which the project supports. This reduced the amount of time required of an IPS unit in headering, leaving the IPS more accessible for page creation.

Host Computers

The project supplied content for two host computers -- the CRC host in Shirley's Bay, and the Toronto host maintained by Bell VISTA.

5.2 Level of Activity

It was an extremely active year in terms of page creation. The new capabilities inherent in IPS2 software and hardware units stimulated interest in the educational community, as these advances allowed more scope in content design and greater ease in the inputting process. At the same time, the previous two year effort to produce sufficient content that would both satisfy curriculum needs and act as models for future design, began to pay off in terms of greater awareness of the technology and it's potential, with a subsequent increase in committment to page creation. From having to actively solicit individuals and groups to participate in page creation, the project began to

receive spontaneous requests from schools, libraries,

special institutions and individuals anxious to understand

and explore the technology at the content creation level. While

activity has continued in terms of inviting groups to participate,

this unsolicited demand for involvement has become a notable trend.

5.21 Number and Status of External Information Providers

During the year 43 institutions participated in page creation

activities. From these institutions, at least 75 individuals

were actively involved in the page creation endeavour.

Although some institutions planned their content by committee

and then assigned one individual to do all the page creation

(such as the Toronto Institute for Medical Technology), the

general pattern represented a process whereby a group of

teachers (or a teacher with several students) would both

plan and input content. The process has been indicative of

a strong desire for "hands-on" experience with the technology.

While a few individuals were "repeaters" (in that they had

participated the previous year, and came back to do new or

updated content), most participants were new to Telidon.

Consequently, the amount of staff time required in orientating

and training these neophytes has been considerable. By March

31, with the exception of a few groups whose involvement

started quite late in the project, all have finished their

training process with content completed and available for

viewing on either or both of the host systems.

5.22 Training Activities

At least three staff members, at any one point in time, have been required to aid outside information providers in the conceptual development, design and inputting of content. The process of turning an interested spectator into an involved page creator involves time spent in demonstrating the technology (at both the on-line level and the IPS level), in hours spent guiding people through the concept development on paper as part of the "storyboarding" process, in terminal and staff time involved in IPS training, and in general supervision during actual page creation.

As the technology has increased in sophistication, so has the amount of training time required for someone to learn to use the IPS effectively. Although the basic mechanics of simple textual and graphics creation can still be taught within a day, the more sophisticated techniques require several days training (such as scaling, rotating, wait functions, text editor and composer, and full use of element/object manipulation). Other factors, such as good design features, levels of interaction in tree structure design, and the use of overlays for effective presentation, require more of the learner and thus presents the need for more ongoing involvement by staff with the work of information providers. In some cases, certain individuals experienced great difficulty in acquiring even the minimal skills required to create content, and either withdrew from the project or handed the inputting over to a TVO staff person. Although this placed more of a workload on TVO staff,

it frequently resulted in content being produced both faster and more competently. While there is a high demand on the part of individuals to become familiar with the workings of an IPS unit, the sophisticated skills required demand more commitment and talent in page creation than was once the case. Frequently people who have been exposed to the workings of the IPS have then been satisfied by the experience and are content to hand over the inputting of their pages to a more practiced and skilled inputter. This trend indicates that a shift in the type of training offered, and the role and involvement of staff in outside productions is changing and evolving to meet the challenges of the technology, as it changes and evolves.

5.23 Staff Page Production

Content Origination

During the course of the year, there have been 4 full-time and 3 part-time staff working under the general supervision of a production manager. This includes some individuals who have worked on short-term contracts, frequently on night shift hours. Of these, three spent over 70% of their time as trainers/counsellors to outside information providers. Thus the demands placed upon staff have been two-fold -- to help develop content by working with outsiders, and to create their own sequences according to guidelines set by project management.

5.24 Editing/Headering Process

All content created must go through an editing process
before delivery to host systems. During this aspect of
production, spelling errors, design flaws (eg. poor
combinations of colour affecting legibility, etc.) are
corrected to the best degree possible. The major task of
editorial review, however, has been in the verification of
routing structures and the use of proper user instructions.
While all content providers must submit a tree structure
before beginning their unit, it is easy to lose track of the
database design when inputting individual pages. Thus an
editorial review is necessary to check that all relevant pages
have been created, with appropriate user instructions, in
order to avoid problems at the end user level (eg., no user
should be led to a "dead-end" situation). Given the nature
and quantity of content produced, the editorial review can
occupy between 5% and 25% of overall production time. Likewise,
the final aspect of the production process -- headering the
content -- can absorb between 5% and 10% of production time,
depending on the extent and complexity of the content (especially
in the area of cross references which if extensive can run
the time up to 20%).

5.25 Terminal Activity

Due to the amount of content produced/edited, along with the
need for IPS training as an on-going process, each terminal
is in use at least 10 to 12 hours a day, Monday through Friday,
and routinely used for 6 to 8 hours on Saturdays.

5.26 Servicing Two Host Systems. The Impact.

In the last quarter of the 1980/1981 operating year, the
project began to supply content to the Bell VISTA field
trial, as well as maintaining a content flow to the CRC
host in Ottawa. Due to the fact that the keypad instructions
for Bell users differed from the instructions on Norpak keypads
used by TVO users, it has been necessary to accommodate two
differing sets of user commands (eg. NEXT -$\rightarrow$). For pages
previously sent to the CRC host, it meant hiring someone to
"rework" the user instructions on all pages suitable for use
on the Bell host. This activity continued well into the
second quarter of the present year. With new content, staff were
trained on the necessity of incorporating both sets of symbols
on all pages, so that the same content could be sent to both
hosts without the necessity of re-editing for one system. They
also had the responsibility of advising outside providers in
the use of both sets of symbols. Due to time limitations, no one
has had the luxury of designing content for each database; thus
content designed for Bell often limited the structural design
for content also sent to DOC. To explain this dilemma, it is
necessary to point out that TVO's top page in the VISTA database
is only one (1) digit to start. Thus, in the VISTA host there
are three levels not available for use -- this has meant that
more care has been needed in monitoring content structures to fit
within this limitation.

With reference to the headering process, the different numbering schemes between the two hosts has meant the necessity of headering each sequence twice -- once for each host. In order to maintain consistency and efficiency in headering, this task has been allotted to one staff person, occupying at least 20% of her time. Given that one person does all the headering on the project, the need for detailed documentation concerning each sequence and its routing structure is critically important; it represents an important housekeeping task that all staff are involved with as part of the final production process.

5.27 Design and Maintenance of Database Structure

Some staff time is devoted to maintenance and expansion of an overall tree structure onto which is "mapped" content layout, according to the classification scheme developed in previous years. As new content is developed, its location in the overall database tree is assigned and its presence is reflected in changes to appropriate indexes. Although much of the activity in this area is of a housekeeping nature, the last year has seen some developmental work in this facet of the project. Until this year, the main access points for users looking for content have been via special indexes giving direct access (full page numbers) to the various sequences or units. While these have proven useful for viewers and are maintained, the impact of very long page numbers (evidenced specifically on the Bell VISTA host), created a demand for a menu-

structured approach to the content. Thus time was spent developing these menus, with emphasis on the use of cross-references to speed up user search time. It is anticipated that the advent of 709E/version 2 software with its more sophisticated abilities for accessing and structuring information, will stimulate further interest and work in the area of developing new database structures.

5.3 Housekeeping

This category comprises a level of activity that sustains all production work. It is the flow of paperwork that structures the production process, enabling it to function.

5.31 Terminal Booking Schedule

In order to optimize the use of the terminals, a bookings schedule is maintained. Placed in a central position within the project offices, it keeps track of who is on what terminal for what allotted period of time. All page creators, staff and outside providers, negotiate with the production manager for time on a terminal. Time is assigned according to a number of factors, such as: availability of an individual's time (since most outsiders have full-time jobs teaching etc., it is necessary to fit their terminal time in according to after school hours, professional development days, days when a supplement teacher can be hired to cover their absence); the time period within which a unit must be completed or left unfinished (due to

external factors such as the institutions need for the content
done for special demonstrations, the budgetary limit imposed
on many outsiders defining the number of hours or days
available); the type of terminal required (can they use a
retrofit or must the content be wholly created on an IPS2);
the availability of qualified personnel to assist in training
or on-going supervision.

5.32 Information Provider Master List Tracking Forms

A master list of all external information providers, with contact
names, telephone numbers and addresses, and their TVO trainer/liaison
person is kept for ready reference. A more detailed chart is also
kept; besides the institutional name and contact information, it
shows the name of the inputter, the trainer, the status of the
sequence (when training time is planned, the time-line for
inputting, projected edit time and headering time, projected
loading period in two hosts, and a final box for indicating that
research and evaluation personnel have been notified and will
follow up by a certain time period). Another wall chart is
maintained which details the overall tree structure of all TVO
database content -- it shows what areas of the tree are filled
and which areas are open for use. These are the main tools in
use for planning and managing the production process. Related
documentation, however, is still required in keeping track of the
finer details of production -- the information regarding the
content produced, the discs in use, the traffic records of discs
sent and received back from host computers.

5.33 Content: Hard Copy Documentation

Whether content is produced by staff or outsider information providers, a basic requirement is the drawing of a storyboard (detailing what every page will contain in terms of text and graphics) and a written flowchart describing the tree structure. This must be done before the edit process can be undertaken. At the same time, the page creator must produce a list of all file names, with details of any cross references, to hand in to the person responsible for headering the completed product.

Two other steps are undertaken once content is created, and headered. The headering operator must keep a log of all UCF file names used and maintain traffic records detailing what units representing what amount of pages have been sent to which host computer, and on what date. At the same time, other staff are responsible for completing a content plan form on which the completed sequence is described -- its title, educational level, area of academic interest, its educational objectives, its presentation format (eg. quiz, serial document stream), and a list of suitable keywords associated with the sequence. This latter information is then used to produce both printed and on-line indexes to databases.

5.34 Content: Floppy Disc Storage

A sufficient supply of eight-inch floppy disc is maintained
to ensure that every information provider has an individual
disc (or discs) on which to produce and store content, as
well as a ck-up disc(s) for security. A disc filing system
is maintained to ensure safe but easily retrievable storage
of discs.

5.35 Content: Floppy Disc to Host Loading

Once a disc has been headered (and content is always transferred
from an original working disc to a separate disc for headering
and loading into a host, for security purposes), the UCF and
traffic forms filled out, then the disc or discs are packaged
for delivery via courier service to the host computer operator.
Given two hosts, the process is duplicated twice. Depending
on the work load of the host operator, the turn around time for
sending and loading content may range from one to several days.
(If the host computer experiences any crashes, or experiences
difficulty in the loading of content, then discs must be
re-submitted; if the host runs into storage problems, such as
the CRC host had in the latter part of this year, then loading
time may be delayed for weeks). Due to some of these difficulties
experienced, it is necessary for staff to monitor the host
computers to establish that content sent has actually been loaded.

An attempt was made to utilize the IPS to IPS down-line loading
software supplied by the CRC. However, the time involved, and
the problems of errors in transmission, resulted in a temporary
abandonment of this method of delivery.

5.4 Volume of Production

5.41 Statistics.

By year end, a total of 75 different sequences or units had been completed (73 English and 3 French language), representing a total page count of 6200. Within this total count, 4400 pages were created by outside information providers, and 1800 were produced by TVO staff. Of 6200 pages, 4800 represented new work (3800 by outsiders, 1000 by TVO staff, of which 600 were French language). Ten sequences reflected content that by their time-sensitive nature required updating or expansion; in total 1100 pages fell into this category. With the new capabilities inherent in IPS2 software, some page creators re-examined work done within the previous year, and chose to redo or "upgrade" their content in order to improve certain presentational aspects that would lead to more effective communication with the end user. 1000 pages were totally recreated as part of this latter process.

5.42 Factors in Production Volume

Graphic Design Development. It is important to note that not all pages created represent a final product for inclusion in an online database. As an application, or sequence, is designed and developed, a great many format pages, design logo pages, and sundry "rough draft" experimental pages are created before a final product is ready. At the same time, a great deal of attention is given to the use of graphics within applications. Thus, although some applications lend themselves to predominantly text-based content, the major focus of the TVO database is to integrate text with graphics.

Telidon being a very visual medium, most of the content created reflects the attempt to use fully the graphic potential inherent in the technology. The advent of a graphics tablet and cursor key capability has significantly increased production time for designers; yet by the very flexibility offered, the designers are offered more scope or challenge in manipulating the imagery and thus may spend more time developing a page, or the "look" of a sequence than with previous versions of hardware/software. With every new refinement in software, there is also a variable time-length involved in learning to effectively incorporate the new functions with the design/creation process. Thus, while it is possible to identify that 75 sequences totalling 6200 pages exist as final product, it is not representative of all pages created -- for every graphic/textual page there may be two or three developmental working pages not statistically accountable. It is difficult, therefore, to judge the level of page production activity based on a quantifiable measure.

Textual Information Developments. While most content reflects a mixture of text and graphics, and all content has a graphic component in the sense of background borders, colours or logos, there are certain types of information packages that are predominently text-oriented in nature. The addition of a text editor and composer as part of the IPS terminal has speeded up the process of creating voluminous text pages, particularly those which require frequent updates (such as a table of contents or any of the other indexes, or menu pages that must be updated with the ongoing loading of new units).

The TECO text editor, available as part of the RT11 package running on the IPS units has also been used to create text-only pages. A distinct development within the last year has been the implementation of the Winchester unit and the TSX-Net software to allow retrieval of textual information from other host computers (discussed elsewhere in the report). Through this means, content has been pulled from other host systems (for example, course information from York University, science and technology information from the national museum) and automatically formatted into Telidon pages. This allows the creation of hundreds of pages of content within a very short period of time. As with the other pages created on text editors, these pages are "dumped" onto background format pages (created in the graphic mode of the IPS) before final loading to host.

Special Production Requests. Due to the high profile that TVO has acquired in the Telidon field, there are frequent requests for special productions from outside institutions who are exploring the technology in terms of its relatedness to their area of endeavour. For example, when the Ontario Ministry of Transportation and Communications held a demonstration of laser technology, they wanted a Telidon component involved. Thus, a graphic artist on the project created pages to their specifications; these pages were then successfully used by the Ministry to show that Telidon pages could be transmitted by laser. Due to their demonstration specificities, these pages were not useable as an on-line package and thus do not appear in our overall statistics.

Similarly, in the first quarter of the year, MDA requested page
creation help in creating content for their demonstation at
Videotex'81. A visitor from England, doing research for a paper
comparing the differences of videotext systems, requested aid
in producing some Telidon pages (to photograph as illustrations
for part of his paper). He was given access to a production
terminal, and staff assistance for two days. These sample
requests do tend to be infrequent, but nevertheless to occur
regularly enough to be considered an aspect of content pro-
duction that should not be ignored in the planning and
evaluation process.

Training Process: Impact. Since much of the TVO's content is
produced by educators from the field, these people represent
a continual training process. This represents a different use
of production time, since pages produced as part of this process
tends to be experimental in nature. Once training has been
completed, there is a "learning curve" factor involved that
slows down the production process (the trend is for few pages
per hour to begin with, and then increasing numbers of pages per
hour as proficiency is acquired).

IPS Terminal Reliability. Production is dependent upon the
reliable performance of the IPS units. Any breakdowns in the
operation of these units can not only disrupt production but
seriously delay overall production goals.

The retrofits experience the most "down-time", while the newest models tend to be more resilient. All units tend to "crash" when faced with overheating or static in the environment. Attempts are made to keep these factors under control. Still, various problems do occur regularly on all units (disc drives are sometimes replaced and frequently repaired; RGP units have failed; interface boards need replacement etc.). The presence of in-house personnel trained on the maintenance of the units has significally reduced "down-time" as diagnostics can be run on site, and adjustments or replacement parts (if available) installed. If parts are not available, then a unit may be out of production for days or even weeks. Unfortunately, the latter is often the case, as few spare parts are available.

5.5 Applications

The Consortium Approach

The development of a quality educational database, serving the needs of
all levels of society, is a massive undertaking. To evaluate the
appropriatemess of Telidon as a suitable techology to fulfill this need,
the active involvment of educational or public service institutions has
been a fundamental goal of the project. These institutions are involved
in evaluating the educational/informational applicability of TVO-produced
content, and are also encouraged strongly to participate in developing
their own content for the database. In this way a range of educational
applications may be identified, created and evaluated for effectiveness.
As previously mentioned, this year 43 institutions (75 individuals)
accepted the challenge of creating content for the database.

Developing the Database.   The Process.

While TVO personnel continue. to develop content (to serve as stimulating
conceptual models for other IPs; to try out innovations in design or
structure; to add quality content to the overall "pool"), a large percentage
of time was absorbed in the demanding task of turning neophytes into
trained page creators/content developers. This procedure involved: the
demonstration of the technology, the encouragement of IPs in formulating
a hypothesis regarding the useof Telidon to meet their particular
circumstance and needs, the skills sharing process (in conceptual design,
storyboarding, operation of the IPS units).

One of the most difficult aspects of developing content is in the initial
conceptualization and design of the unit. It has been very difficult to
free people from a linear, print-oriented frame of mind. Although some

information is suitable for a linear, document stream format, staff
work very hard to encourage IPs to consider and utilize the interactive
nature of the technology. Staff are also involved in not only shaping
the structure of the content, but in its appearance and size. Typically,
IPs become so intrigued with the potential of the system, that they tend
to plan very large (several hundred page) units, often incorporating
complex graphics (generaly to be adapted from other media). As they
begin to realize that page creation, particularly with regard to graphics,
is not an overnight skill to learn, these expectations are lowered, and
under the direction of staff, are packaged into "do-able" sized units.
Since many graphics are borrowed from other media, the staff must remind
IPs of the copyright aspects of their endeavour and assess with the IP
the suitability of illustrations to be adapted. An eye for what will
or will not work as a drawing, is an ability that comes only with exper-
ience in page creation. It is not surprising then, to note that staff
are frequently called upon to redesign, partially create, or rigorously
edit those pages produced by IPs. In rare cases, some individuals bring
an artistic sensibility or good writing skills to the project, and require
a minimum of supervision and guidance. While guiding IPs in assessing
the size, structure and design aspects of a unit (according to factors
such as time available, skills or handicaps), the IP is asked to identify
his or her target audience, the specific topic to be covered, the educational/
public service objectives to be fulfilled -- these must be done before
the unit is finally conceptualized and committed to IPS inputting.

While in theory the consortium approach to building an educational data-
base is sound, the many factors that must pull together to create a
quality database often run afoul of reality. Good intentions alone cannot

produce a substantive sequence. Through rigorous editing in consultation with the information provider, staff try to maintain a certain standard or level of acceptability in the work of outside IPs, but the end result often produces an overall database whose quality ranges from merely adequate to very good.

The Range of Content

The year saw more interest and input from the traditional educational institutions (elementary, secondary schools, community colleges, universities) and an increase in the involvement of special interest groups (Institute for Medical Technology, two schools for the deaf, teachers of the retarded, the St. John Ambulance).

At the school level, several high schools produced curriculum-oriented content in several subject areas (Math Dilatations, Geologic Mapping, To Kill A Mockingbird Study Unit, to name a few) and two public schools undertook units to teach arithmetic (Common Fractions, Bear Tales About Adding) and primary English skills (Boots, Spurs and Go, a word quiz). All were planned to teach in a more interactive format to involve the students dynamically in the learning process. At the community college level, several approaches were undertaken. Mohawk College devised a unit to be used as a supplement in the television arts program (Video/Flow -- in linear format); Niagara College produced an English unit for remedial work (Devilish Definitions -- in a format for either linear or interactive use); and Sheridan College had students involved in the creation of a TVO television-related unit (Eureka: Acceleration) as part of a work-placement course for graphic arts study. Although not inclusive of all participants, these groups are representative

of the nature and range of involvement at the schools and college level.

From the library community, the year saw the involvement of two large
regional library systems (Geogian Bay and Lake Erie) and two specific
libraries (Hamilton Public, which cooperated with the McMaster
University Health Sciences library, and Barrie Public). Each concentrated
on units to advise clientele about library or community services, or on
how to find specific types of information).

A number of special interest groups also became involved in devising
and testing applications specific to their clientele's needs. The
Ontario Federation for the Cerebral Palsied continued to create material
related to their special needs in areas such as home services, accessibility
to public buildings. etc. A new aspect of their involvement was the
increased production abilities of their members dur to TVO software/
hardware modifications making the keyboard more accessible (i.e. usable).
The Toronto Institute of Medical Technology became involved in order to
determine the suitability of Telidon graphics in highly specialized areas
of medical technology, and to explore the feasibility of Telidon in the
transmission of health care information to professionals in remote areas.
Personnel from T.I.M.T.'s medical illustration department have designed
and produced a sequence on "Areas of the Abdomen and Body Types", for
use in their lecture labs.

An exciting development rose out of a staff project to create some support
material for the TVO childrens' television series, Readalong. Several
approaches were used in creating content to introduce words to pre-school
children. The presentational aspects of the sequence were particularly

important to this application to avoid confusion and distraction
to the young viewers. Telidon's limited animation capabilities were
utilized to stimulate and maintain attention. As well, the medium's
interactivity was exploited to elicit user participation, as was the
ability to build language skills through repetition. As part of the
developmental design process, the work was evaluated in progress, by
Readalong production staff, and by outside consultants involved in
primary education. Among the consultants involved in this process,
were teachers of the hearing impaired and the mentally retarded. Upon
review of the Readalong sequence, staff members from the Drury School
for the Deaf felt that the approaches developed could adequately
address problems encountered in teaching the deaf. As a result, they
have developed a basic language skills sequence to be integrated into
the school's academic curricula. As well, teachers from the Metro
School for the Deaf have expressed interest in developing a further
Readalong sequence with sign language symbols as part of the graphic
input. Another off-shoot of the Readalong experiment has been the
development of two sequences designed to teach basic life skills (eg.
Safety Words Acquisition) by teachers of the mentally retarded. The
inter-relationship of these developments reflect a positive expression
of the consortium approach to database development at its most
dynamic and effective level.

The Problems Encountered

While the efforts involved with some outside groups resulted in very
good sequences (and gave good return on the investment of staff and
terminal time needed), such was not always the case. The

experience of redoing or heavily editing many sequences (to maintain a certain level of acceptability in design and structure), has underscored the point that not everyone has the capacity to effectively master page creation skills. In many cases, the most effective way to develop content combined the subject expertise of an educator with the design and inputting skills of a qualified staff member. Regardless of who did the final page creation, a common problem to all inputters was the availability of terminal time.

Access to IPS units was very competitive. While a fair balance was strived for, there were nevertheless times when people were frustrated at not being able to book a terminal for as often or as long as they had hoped. Despite the intensive use made of the terminals (up to 12 - 14 hours a day, plus Saturdays), there were still too many people for too few machines.

5.6 French-language database development

At the suggestion of James Feeley TVOntario incorporated into the 1981-82 field trial proposal an undertaking to produce 1000 Telidon pages in French. In due course, a full-time co-ordinator of French-language data base production was added to the project group. He has been assisted in the work by several short-term contract employees.

The decision was made to meet a variety of content objectives that would demonstrate the range of applications of Telidon using text and graphics. Subject-matter includes the field of communications media (including videotex itself), general science, graphic presentation of statistical data, a general-interest information game, and bibliographic reference material.

As the various sequences have been completed, they have been loaded into the CRC's 11/34 host computer, and are available for loading in the Montreal database. Additionally, two sequences have been accepted by VISTA for display on their French-language service.

While the attainment of the 1000-page target is well on its way, completion will of necessity take until June of 1982. One factor bearing upon the speed of delivery is the scarcity in Ontario of skilled page creation personnel whose first language is French. Another is the relative scarcity of page creation terminals.

TVOntario has been working with four terminals to accommodate personnel on the project team and those associated information providers representing schools, colleges, and public libraries. The terminals are in use from morning until night and sometimes on week-ends. As a participant in the VISTA project, TVOntario was sometimes able to book people on VISTA terminals elsewhere, but the competition for available hardware remained uncomfortably fierce. With the addition of French-language page creation, it became necessary to rent time on an IPS in Montreal, and for one of the project group to commute on a part-time basis.

5.7 Public Service Database Development

In accordance with the proposal of 1981/82, the Project staff undertook to co-ordinate the development of a Public Service resource on both on-line and broadcast Telidon.

To date, over 500 pages have been produced for our on-line service. Sources of content have varied:

1) Participants in the field trial have produced a range of materials such as: an introduction to the Blissymbolics language (Blissymbolics Communications Institute); an explanation of precautions necessary in the case of a rabies contact (University of Guelph); an expanded listing of buildings and services accessible to the handicapped (OFCP); a variety of public library information.

2) In-house staff have updated the tourist information sequence - TourOntario and the listing of available educational materials at TVOntario.

3) Another area of activity has been in the translation of existing databases to a Telidon format - in particular, the Ministry of Education's Student Guidance Information Service.

4) Similarly, activities in the broadcast Telidon (database) development have included expansion of public service materials. By virtue of its newsworthy, daily service, Edutel provides a significant amount of content aimed at fulfilling public needs. Of the broadcast magazine's 110 pages daily, approximately 75% ranks as a Public Service resource, for example: News in Brief, Weather, Report on road conditions, special bulletins

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to the public. More specifically, the broadcast staff

have acquired an information package of 50 pages from

Statistics Canada as well as a 60-page first-aid package

produced by members of the St. John's Ambulance Association.

In sum, the Public Service dimension of Telidon is being

expanded and further sources of information (such as the

National Job Bank and/or CHOICES) are being investigated.

5.8   Inferences

5.81   The second-generation IPS terminals have proved reasonably

rugged under heavy work loads, but attention is drawn to the

need for a user-responsive program of maintenance, necessary to

avoid expensive down-time.

5.82   The rapid generation of Telidon versions of existing ASCII

database materials can be addressed very well using the information

interface referred to in 8.4 in combination with the text editor/

composer software in the IPS2. It is possible also to employ the

TECO editor, operating on RT-11 version 4 system software, to

provide a more powerful editing system on the IPS.

5.83   The development of serviceable databases using IPS2 terminals

is a labour-intensive process and one requiring the involvement

of people with a high level of skill. The prospects for a rapid

emergence of quality materials stand to improve with the dissemination

of more page creation terminals in locations all across the province.

It should be noted that the development of the database
materials created for the Telidon and Education project
represents the part-time work of more than 75 people.

5.84 Prospective operators of production "shops" should be
aware that the so-called "house-keeping" aspect of operations
is a significant component of a coherent and effective
production process.

5.85 The process of developing applications of potential value in
a variety of educational environments has been well begun,
but is far from being advanced. The process must continue
at length before it will be possible to discern general
features of successful applications . This poses a problem,
but one that cannot be avoided: database development must
reach "critical mass" before it can be said to be truly useful
on a year-long basis or for entire course units, yet the process
of discovery on which such units should be based must proceed
in parallel.

6. Database Development: Broadcast

6.1   System Components

6.11   Page Creation Level

It is mandatory that there be one dedicated IPS unit for teletext page creation. The other three IPS units can be used as backup support when this is required.

Based on the technical success of the Apple Telidon interface, the project explored a more technically sophisticated system. It was decided to acquire a VT 103 DEC microprocessor with a DSD 880 Winchester Drive with three hard storage discs. This system housed the TSX-Net software (GABA). (See sections 8.1 and 12.2 for more details on the "Winchester" configuration).

The VT 103/DSD 880/TSX-Net combination permits fast and efficient information retrieval. The "F Term" program, which is a part of the GABA software allows the terminal in the Telidon office to appear as a linked terminal to another computer. The communications program F Term requests that another terminal send us information, which can be perused, stored on a hard disc and also edited.

The hardware/software combination presently being utilized offers more diversity and certainly, far more storage capability, than the Apple Telidon interface. Alternative information sources such as telex and facsimile do not allow large amounts of text to be stored automatically; unfortunately they demand manual creation of Telidon pages.

6.12 Host Level

Currently in use is the Norpak TES/1 inserter-encoder system. Previous host systems were the PDP 11/34 running with Cableshare software, and the CRC encoder with limited storage and cycle capacity. (See section 8.1 for a complete summary of host level system components).

6.2 Level of Activity

6.21 Planning

The development of a broadcast videotex service involves many levels of activity, calling upon diverse skills and resources. Planning is a dynamic activity that is prominent in every aspect of organizing, implementing, and operating a successful service and thus can be said to never end. It is, however, the first and most critical task facing a broadcaster considering the challenge of offering such a service. The nature, size and shape (structure) of the service to be offered must be clearly defined. Once defined, decisions must be taken with regard to the resources (technical and human) needed to implement that service; often the reality of resource availability will alter initial decisions regarding the nature of the service undertaken.

While the basic nature of the broadcast videotex service was defined within the first two years of the project, its size

and structure remained variable during this time period,
due to technical and software fluctuations within the
encoder configurations. Initial plans for a magazine
of over 250 pages had to be set aside temporarily because
of the limitations of the small CRC encoder, and then
indefinitely as it became obvious that the Cableshare
system was too slow to handle that size magazine. Other
factors related to limitations of time, personnel, and
equipment also indicated that a 100 - 150 page magazine
was a realistic goal for the September, 1981 - April,
1982 time period. With an overall plan of the nature,
size and structure of the magazine redefined, greater focus
could shift to those activities involved in implementing
the service.

Implementation

The maintenance of a small 30 page magazine occupied the
first quarter of the year, with most of the activity centered
on the technical software debugging and testing of the
Cableshare system. Once it was accepted, activity continued
on the operational loading/running and software programming
side (with modifications to the system to provide database
sorts) but an explosion of activity occurred on the content
development side. With the 30 page limit restriction lifted,
the menu structure was filled out and new categories of choice
made available. The design of format pages, logos, the use

of techniques for page access (the use of cross-references
via the "jump" command, use of overlay pages) -- all led
to a new and dynamic "look" to the service offered. Detailed
content programming requirements came into focus and were
acted upon as expeditiously as possible.

The advent of the TES encoder involved technical testing and
software familiarization in its set-up. It also meant a
change in the database structure used to support the active
cycle. Where the Cableshare database had to utilize a numeric
file structure, the TES allows an alphanumeric filing system
to be utilized. This allows more flexibility in identifying
database content. Thus changes to the database structure were
implemented to make full use of this flexibility. The TES
unit also produced a change in the structure of the active
cycle. To make optimal use of the way in which the encoder
"mapped" pages onto the VBI lines, the order of main menu choices
had to be revised. The active cycle reflects categories listed
in descending order of prioritization. In general, this plan
has been maintained, but some concession regarding the technical
limitations (sections containing the most number of pages must
be placed at the beginning of the cycle) had to be accommodated.

The desire to incorporate a news service feature as part of the
magazine led to an agreement with Executive News Service (a
branch of United Press International) to access their news wire
feed. To implement this feed, an improved ASCII software/hardware
interface configuration was acquired, set up and implemented. Its
management became incorporated into the daily operating procedures
needed to maintain the broadcast service.

Daily Operating Procedures

Daily activities are concerned with the loading and updating of a 100+ page magazine, according to the programming requirements and application guidelines discussed in subsequent sections of this report. To keep track of the information flow, a programming log is maintained to identify all content created (its source, creator, its storage file name and where it is located -- on hard or floppy disc), when the content is to go on the active cycle, how long it is to stay there and when it is to be replaced. As well, a daily wall chart (a re-usable greaseboard) is maintained to detail, at a glance, what is currently on air at any given time (it is used as a reference point and a reminder of loading times).

To a certain degree, activities associated with the production of on-line oriented content has benefitted the broadcast videotex service. As large sequences are developed for on-line application, efforts are made to create the content within a modular format such that the sequence can be repackaged and placed in the broadcast cycle. The modules can then be offered in an on-going series format (eg. chapter one today, chapter two tomorrow) or as independent features. Although not all content can serve such a dual role, the presence of such a "bank" of content has been useful in a two-fold way. First, it has allowed some participants to access their content without worry regarding the cost of the telephone calls associated with on-line access.

Second, it helps supply the demand for new content on the active cycle. This demand is constant given the nature and focus of the magazine. Even with this ready-made source of content to call on, it takes the full-time commitment of one staff content creator/co-ordinator with three part-time inputters to maintain the current level of service offered. The production of original content for broadcast use may not involve the lengthy, complex units (requiring weeks of design and input) associated with on-line sequences but the voracious demand for new content can easily require as much, if not more, production time. This factor alone has been a strong motivation to explore the use of sophisticated interfaces to speed up page creation activity.

6.3 Programming Requirements

Introduction

Programming incorporates four related activities:

1. identifying the content requirements of our audience

2. finding sources for the content requirements

3. scheduling the content (taking into consideration the technical parameters of the broadcast operation)

4. either creating or co-ordinating page production activity (both automatic, semi-automatic and manual)

To date, in other broadcast videotex services (eg. Ceefax,Oracle, and the Swedish service on Sveriges Television), content has predominately focused on news, weather, sports and TV-information. Although our teletext magazine has information in these categories, a large component of our magazine is devoted to educational content.

A detailed examination of the "menu" offered by TVO's broadcast
magazine will reveal the sources of information (both original and
those tapped from other sources). Also discussed will be the production
time required for the various components and the frequency of
updates once the material is incorporated into the broadcast cycle.

Content of EDUTEL (TVOntario's broadcast videotex magazine)

The contents of TVO's teletext magazine is distributed among the
following categories: 1.   News

2.   Special Features

3.   Edu-Opportunities

4.   Current and Choice

5.   Broadcast Week

6.   Making a Living

7.   Weather and Travel

8.   Food and Health

9.   Help? Help!

Each of the categories contains information which is of interest to
the general public and to our educational clients. It is technically
possible, and in many cases, most desirable, for the information
in these sections to be updated daily or even hourly. If the project
had a dedicated teletext operator whose sole responsibility it was to
load updates, the cycle could be updated four times hourly. The

total number of pages in the broadcast magazine usually ranges
between 105 and 120 pages. The size of the cycle is restricted
primarily by the maximum number of seconds required to access
a newly selected page (usually between 14 and 18 seconds). The
programmer has to strike a continual compromise between giving
the viewer a wide selection of content as well as an acceptable
access time. Because of the small size of the cycle it is not
advisable to go down more than three levels in the tree structure.
In contrast to interactive videotex, broadcast videotex pages are
restricted to a complexity of six blocks. A page with more than
six blocks can be accommodated in the cycle by using overlays.

6.31 <u>News in Brief, 1st menu selection</u>

Using the Winchester unit and the TSX-Net software, a TVO staff
member collects the Executive News Service feed from approximately
9:00 a.m. to 9:45 a.m. daily. A selection is then made of two or
three national and world news stories, up-to-date sports scores,
and often a sports story, and one or two financial stories. The
national news stories usually focus on items that are of Canada-wide
concern, i.e., the repatriation of the Canadian constitution, the
Liberals' Energy Bill package, etc. Text formatted package is
transformed into Telidon pages by running the Norpak text
composer software routine at the IPS unit. An updated news
package is inserted daily into the EDUTEL cycle between 10:30 a.m.
and 11:00 a.m.

The News in Brief menu also includes education news, weather information and current events. Current events from a variety of different sources have been included in EDUTEL, eg., the University of Guelph, The Quetico Centre and the Ontario Science Centre. The University of Guelph calendar of events is accessed from their computer centre using the Winchester and the TSX-Net software. Although TourOntario is an on-line sequence, it was possible to re-edit the upcoming events section to fit into EDUTEL's current events heading. The weather information changes daily, while current events information and education news are updated weekly.

6.32 Special Features, 2nd menu selection

The Special Features section usually incorporates one major item - Tag the Flag, for instance- and one or two minor items. The briefer one or two page selections have included Today in History and Who Said It. They are changed daily while Tag the Flag might remain on the cycle for a week. Today in History was created in the project centre specifically for teletext while Who Said It was designed for both the interactive and teletext databases. Another brief item will be an upcoming Quick Quiz, which will showcase mathematical puzzlers.

Also spotlighted in Special Features are strictly educational sequences that offer distant schools the chance to test the learning potential of Telidon without incurring huge phone costs. An example of this was a geometry sequence of less than twenty-five pages which was broadcast for a week.

6.33 <u>Educational Opportunities, 3rd menu selection</u>

Information in this category includes education news and summer job information. The education news is derived from bulletins, curriculum information, and course descriptions from the Ministry of Education. The summer job information is a repackag.ing of the Student Guidance Information Service sequence. There are plans to edit a resume sequence created by Centennial CAAT for inclusion in this section. The educational items are updated on a weekly basis.

6.34 <u>Current and Choice, 4th menu selection</u>

Recent movies, books and records are reviewed on a weekly basis. Although the cycle can no longer support the number of pages required for a weekly Top 30 records chart, it has been featured in the past. The information for the records chart was inputted manually into a text file but the actual compostion of Telidon pages was automated using the text composer software. The <u>Current and Choice</u> menu also cross-references the user to the <u>Broadcast Week</u> menu (no.5). The content choices are slightly influenced by the large student audience, ie. pop records are reviewed rather than middle-of-the-road selections.

6.35 <u>Broadcast Week, 5th menu selection</u>

<u>Broadcast Week</u> features TVOntario's program listings and
programming highlights. The TVO listings are produced by
TVOntario's Information Services department approximately six
weeks prior to their boadcast date. This generous lead time
enables the EDUTEL staff to prepackage the television listings.
The titles and times are inputted into a preformatted text
file and then, using the text-composer software, Telidon pages
are automatically created. Since it is assumed that there is
a programming requirement that TVO listings include more than
one day's schedule, they presently straddle two full days
listings. The highlight pages are based on press releases from
Info Services; they are created manually a week or so in
advance of their air date.

6.36 <u>Making a Living, 6th menu selection</u>

This section directs the viewer to:

1) summer job information (a cross-reference to the
   Edu-Opportunities menu),

2) Statistics Canada information. This material is sent
   to us on a floppy disc; it is formatted in a tree-
   structure suitable for an interactive videotex database.
   It is then repackaged in "chapters" or teletext document
   strings, which can be rotated on a daily or weekly basis.
   The Statistics Canada information featured is employment
   figures, the consumer price index and trade statistics.

3) financial news (a cross-reference to the <u>News in Brief</u> menu),

4) Consumer Tips. A Telidon staff member manually edits and
   inputs bulletins from sources like the Better Business
   Bureau or the Ontario Ministry of Consumer and Commercial
   Relations. This segment is updated weekly.

6.37   <u>Weather and Travel, 7th menu selection</u>

Using the Winchester configuration, and within the time access guidelines laid down by the Atmospheric Environment Service (12:00pm-12:15 pm access time daily), weather information is captured daily. After editing and text composer processing, regional weather forecasts for the following day are prepared. Although the regional weather forecast encompasses the geographical scope of the province, there is a slight emphasis on choosing weather information from areas where our decoders are located.

A world weather page presents a selection of daily temperatures (taken at noon, GMT, daily) and weather conditions from major cities in the world.

Marine forecasts will be offered in the summer; sailors may find them of value! It must be realized that the limited size of our cycle only permits us to use a fraction of the information available at the A.E.S. All of the regional and world weather pages are loaded into the cycle by 1:30 pm daily.

The weather map for the following day arrives by teleprinter in mid-afternoon. A standard weather format map is manually updated with the appropriate weather symbols and codes; it is loaded into the cycle before the following day. The other daily feature of the Weather and Travel section is a report on road conditions. The staff is not available to make use of the Ministry of Transportation & Communication's three daily telex feeds; we only use the early morning feed. The road report is on the cycle by 9:45 am. As highway conditions improve in the spring, the road conditions report is replaced with Marine forecasts. In the summer of 1981, a teletext sequence was designed by the Ontario Cycling Association; it was inputted by TVOntario staff members and monthly segments were broadcast on EDUTEL. Also included in this section are repackaged segments from the TVOntario on-line sequence Good Driver Quiz.

6.38   Food and Health, 8th menu selection

Food and Health   features a weekly opinion piece from the Federation of Ontario Naturalists. Recipe for Today, a sequence on DOC's on-line databases, has been repackaged for EDUTEL ; as the title states, a new recipe is broadcast daily.

The St. John Ambulance Society has designed and created a sequence for both the interactive and teletext databases. Some components of this sequence have been broadcast to date - it is presently rotating on a weekly basis.

6.39   Help? Help!, 9th menu selection

This section directs the user to the sources of help he or she

requires. Therefore, it includes a phone number at the Telidon

project centre to call if you are experiencing mechanical

difficulties. It also directs the user to some of the more

universal emergency phone numbers. Lastly, it provides suggestions

on who to write for information on a wide range of topics, --

government help agencies, pamphlets on health problems, social

problems, business advice, etc., etc.

Summary

The process of programming a broadcast Telidon cycle is more

analogous to a small newspaper operation than to the "programming"

of an educational videotex database. The sources of information

tend to be different; the life-cycle of the information is

predominantly different; and therefore the process of management

of information flow is different. The schedule of work activities

is dictated by the nature of the enterprise; also, the work load

for effectively supplying a user-sensitive service can be

very heavy.

6.4   Applications

Introduction

The information broadcast on EDUTEL is deemed to be of interest to the general public, as well as to education-sector users.

When EDUTEL reception is reliable and the content is on schedule, users, especially in libraries and museums, rely on it for quick Telidon demonstrations. It is an added bonus that they do not have to pay carriage costs since EDUTEL is accessible free-of-charge anywhere TVOntario broadcasts. Each sub-menu also has an educational rationale. A quick survey of the various categories will highlight some of EDUTEL's educational applications.

6.41   News in Brief

Up-to-date news stories can be incorporated into current affairs study. An economics class will find financial and stock market information of value. The current events section might suggest interesting destinations for school field trips.

6.42   Special Features

There are several applications for this section.

(a) strictly educational sequences that offer distant schools the opportunity to evaluate the learning possibilities of Telidon without incurring expensive carriage costs. These sequences are scheduled for agreed-upon periods, -- 2 days, 5 days, 2 weeks, or whatever arrangement seems most suitable. The Maynard school, in Prescott, Ontario, requested that Construction in Geometry be broadcast for a week.

(b) one-a-day "spots" designed to stimulate interest in

certain kinds of information that won't necessarily fit under

the other eight main groupings. (e.g. Science/Technology up-date,

Today in History).

(c) "occasional" features to mark some special event or

area of interest.

6.43 Educational Opportunities

The intent of this section is to reach people both inside and

outside of educational institutions. The people inside

benefit from knowing about professional events (conferences,

professional development courses), the recent appearance of

a new learning resource, news out of the Ministry of Education

etc., while the people "outside" benefit from knowing

about educational opportunities ranging from correspondence

courses, TVO learning academies, SGIS information, and

unusual courses being offered by colleges and universities.

6.44 Current and Choice

The rationale behind this section is to draw people's

attention to the latest books, films, recordings, and other

cultural expressions. It is a stimulation to students to

seek out alternate media.

6.45 Broadcast Week

The principal audience is deemed to be teachers who want to know what's available for use in the classroom. On the assumption that the point is to permit them to lay plans for upcoming classes, the TV listings are for two days of programming. The highlights permit us to give more background information; this is of interest to both educators and our wider audience.

TVOntario's viewers might see EDUTEL's service Broadcast Week while visiting their local library, prompting them to watch an upcoming special that night. TVOntario's Telidon broadcast videotex service thus helps to publicize its regular programming.

6.46 Making a Living

The intent of this section is to cover both business and labour. The information on careers, stocks, money and banking, and consumer information could be used in a social studies or economics or business classroom.

6.47 Weather and Travel

A geography class would find the weather map and the regional and world forecasts to be of interest. The newsletter from the Federation of Ontario Naturalists could spark a discussion in a natural history class.

Weather and Travel is very popular with the general public - especially the weather map.

6.48 Food and Health

The information contained in this segment forms a valuable resource for a home economics or a health class. Nutritional recipes feature seasonal produce. The water safety tips could be useful for a gym class, as well as a concerned parent at home.

6.49 Help? Help!

All of the information in this section is planned to give people quick information that helps them cope with problems.

6.5 Inferences

6.51 Database development must be approached differently for broadcast applications than for videotex applications. This is certainly true for broadcast cycles of 100 or so pages transmitted via relatively few VBI lines. The emphasis tends naturally to be on current information.

6.52 The challenge of gathering current information from a variety of sources, editing it, and presenting it in Telidon format, is best approached via the use of information interfaces. Every "teletext" programmer will find it necessary to employ one or more such interfaces in order to manage the volume of work and at the same time exercise appropriate editorial judgments in the selection of program items.

6.53 One of the largest challenges is tailoring the content to suit the demographics of the target audience. This involves (and may require) substantial feed-back from the audience.

6.54 Future data-capturing potential in the decoders may allow a much longer acceptable cycle time, and therefore substantially more pages. With more pages would come a greater choice of programming options.

6.55 Operators of broadcast Telidon services must perforce be more sensitive to the "size" of pages than their videotex counterparts, since the size of pages affects the length of the broadcast cycle. This has implications for the suppliers of weather map feeds and other information featuring use of complex graphics.

6.56 Operators of VBI broadcast services should proceed in the awareness that textual content must be presented concisely for reasons of efficiency of communication and economy of data expenditure per cycle. This has implications for the handling of the editing process.

7.   Technical System Operation: Videotex

7.1   IPS (Information Provider System)   Components

      Maintenance and Repair Factors

      At the beginning of the project year, there were on site, two

      IPSO units, and one IPS1. Each unit received upgrade kits, to

      enable them to operate with the new picture editor commands

      (scaling, rotation, etc) and text editor facilities. Of the

      three, only the IPS1 could communicate with a graphics tablet;

      due to a defective communications board, the tablet was not

      operational until mid-June. Of the other two units, one

      chronically needed repair and was finally set aside for spare

      parts. Fortunately, midway through the year, the project

      received two version 2 IPS units -- one via DOC (in the summer),

      and one on loan from Bell (received in the fall) as part of

      their field trial; each supplemented with a graphics tablet.

      With the advent of the IPS2 units, utilization of the mini-

      database software was possible, and keypads were connected to

      these units.

      Over-heating and susceptibility to static remained environmental

      factors that cause occasional crashes. To a certain degree,

      overheating was kept to a minimum by the removal of the back

      covers (on IPS2 units) to allow more air to circulate, and

      via a regular maintenace schedule for the cleaning of filter

      components (if allowed to clog, heat becomes a real problem).

      During the course of the year, eight field service orders were

needed from Norpak. The IPS1 unit needed its RGP and disc drives repaired at the factory; an IPSO needed factory repair to its backplane. Other units experienced defective DSD interfaces, a DRV11 in one RPG needed changing and so on. The units which gave the most trouble were the retrofits; in general, the IPS2 units have proven very resilient.

A significant factor in the maintenance of the IPS units has been the presence of two trained technicians on-site. A two-day training session by Norpak to TVO staff has proven to be of real benefit. At least once a month, a system will go down. Sometimes the problem is something as simple as a slipped belt on a disc drive, while at other times it may be a damaged board (requiring much more time to diagnose, and immediately fixable only if a spare board is available). In-house repair has been a boon due to the length of time required to get a response from Norpak (whose minimum turn-around seems to be a week, and more often than not, several weeks).

Production Factors

Monitor Discrepancies

The small monitors used on the IPS 2 units are an improvement over the use of the modified TV sets employed by the retrofits as far as the imputter/operator is concerned. There is less eyestrain because of the smaller dimensions of the screen and the glare factor has been greatly reduced. There is a difference in the display of colour intensity between the monitors and the

TV sets which reduces eyestrain on the IPS 2s with each version, there are problems in the use of certain colour combinations, as the true relationships can be distorted (leading to mis-judgements in the final appearance of a page). For example, retrofit greys appear one level brighter than in actual fact, and all colours appear to be darker on the IPS2 units than they are on TV sets.

Graphic Components

The use of a graphic tablet and the use of cursor key movements has made drawing easier and yet more refined in detail, than was possible with a joystick. The ability to manipulate elements at the object level has proven to be a significant factor in the editing of pages, and the ability to build up a library of re-usable images. The sketch mode had remained under-utilized because of display problems (the line would produce sharp jags as it was drawn). Not until February was this problem adequately understood and addressed by Norpak field service personnel, who solved the problem by changing the bit rate between the tablet and the IPS unit -- the mode now works as it should and will no doubt contribute its share of design capabilities in the future. The wait function has been utilized to a minimum degree, as it is cumbersome to implement and extremely difficult to edit; as well, the imminent arrival of 709E software (which will effect the timing of the waits, although no-one quite knows how, except it will speed up by some factor any current wait commands) has also held back any real use of it. With 709E implemented and the

use stabilized, this function will no doubt be explored more
fully by those capable of this degree of graphic sophistication.

Retrofit/IPS2 Compatibility

Although pages created on a retrofit may be edited on a system 2,
the reverse is not necessarily true. Especially in regard to
graphics, it appears that the retrofits have difficulty in editing
any pages produced on an IPS2. As a result, care must be taken
in booking people on compatible systems (i.e. if they start
on an IPS2, they must continue and complete their work on a 2).

Use of Text Editor/Composer

This is very useful for turning out large quantities of text-
oriented pages. However, it requires much more extensive training
(above and beyond the usual training routines) as it reflects a
greater degree of computer sophistication. Those people familiar
with text editors or word processors learn without too much
difficulty, but it represents an added challenge to people without
this background. In general, it is not a technique tried by
most participants, as the amount of learning time is too great.
It is suitable for fully qualified, trained operators working
on a day-to-day basis with the technology.

7.2 Headering and Loading

Headering is done separately for the DOC, the VISTA field
trial, and other outside databases. It is a simple and
efficient operation primarily because of TVO modifications to
the header-editor software (for technical details about the
software modifications see section 12.1).

Headering is done in a batch-processing mode although cross-
references must be edited individually. By using the VT 103
and the DSD 880's large storage capability and increased
processing speeds, it is possible to header more quickly than
if an IPS unit is used.

Headered sequences are shipped by courier services to outside
databases. They are loaded into their various host computers
by operators at the site. This method has proven to be
reliable although there is a time lag between TVO's processing
of new material and corrections to existing sequences because
we cannot control the inputting of information at the host
computer sites. We have experienced some time delays because
of external system problems.

7.3   <u>User Terminals</u>

The Telidon terminal consists of 3 devices: an electrohome TV modified to accept RGB input, a Telidon decoder, and a keypad. The first generation terminals used Norpak MkI dual mode decoders. This system was operated ½ duplex 1,200 baud, mark parity. The only means of accessing this host computer in Ottawa was direct distance dialling. Initially problems with the Mk I included overscanning on the T.V. monitor and general unreliable performance. The overscanning problem was corrected during the retrofit conducted by CRC. The Mk I decoders were never reliable and it was a great relief to switch the field trial to the Norpak Mk 3 dual mode decoders.

The Mk 3 decoders have proved to be far more reliable than the Mk I. To date of the 50 decoders received only 3 have failed in the field. The videotex board appears to function quite well. The major problem is static electricity via the keypad damaging the circuit. Difficulties with the teletext board are covered in 8.3.

The Mk 3 decoders lack the operational flexibility of the Mk I decoder which provided external switches to control, parity, baud rate, word size, handshaking. Parity, baud rate are alterable in the Mk 3 by changing soldered straps on the PCB. All the Mk 3 decoders were shipped to TVOntario with the

baud rate set for receive = 1,200, transmit = 300. With this setting the decoders could not communicate to any Telidon host computer. The decoders are set for odd parity yet two of our sites were using the terminal to work with the NATAL host (at NRC) which is an even parity environment. A rumor made the rounds that the teletext board needs to be set for 300 baud to transmit to the videotex board. No documentation was provided by CRC or Norpak to answer any of these questions. Personal contact with technicans at Norpak provided the information about baud rate and parity straps. Since there was no reliable source of information about the need for 300 baud signal for the teletext board a switch to provide for 300/1200 baud signals was installed on decoders that were deployed prior to January, 1982.

Virtually all decoders used in the operation of the field trial have been dual mode decoders. Many of the difficulties experienced by users have to do with the inevitable "bugs" that accompany any prototype system. The experience gained shows that when the technical problems are controlled a terminal that provides both on-line and broadcast service offers a viable and marketable combination of responsiveness to user needs and economic operation.

7.4   Carriage, Networks

Datapac:

The 1981-82 field trial year offered the project its first opportunity to use Datapac communication on a regular basis. This constituted an important test situation. Previous field trial reports had underlined problems of access and cost associated with long-distance connection with the host computer. They had recommended that a move to Datapac be made as soon as possible.

While at this writing the project still awaits the installation of 5 Datapac ports on the VISTA database, a good many field trial sites have been able to access the PDP 11/34 at CRC. Our conclusion is that access via Datapac is simpler, and of course the cost is much less, than long distance direct dialling.

On the other hand, the reader should be aware that packet switching networks such as Datapac are still in a stage of evolution. They have nodes in major centres operating at 300 and 1200 Baud, but a good many cities have only 300 Baud connection, while the majority of smaller centres can only get on to the system by phoning long distance to the nearest node. Clearly, this is inequitable from the user's viewpoint, and the inequity is echoed on Datapac itself because traffic level and distance are factors that raise the cost of the service.

At this writing, the hourly rate for connection to the node within a "free-call" area is $1.50, the minimum charge per kilopac is 35 cents, and this charge goes up in accordance with amount of traffic and distance. Our information, for example, is that one kilopac costs 65 cents for a user in London, Ontario, accessing a computer in Toronto. For North Bay, the charge goes up to over $3.00 per kilopac. The argument for down-loading of data goes up wherever the charges are up.

Assuming an average of 20 hours connection per week, time charge would be about $30 per week, and kilopac charge could range between, say, $5 and $15 per week. The projection for the year is approximately $2000. Whether this is a prohibitive factor depends upon value received, but it is not unreasonable to assume that (a) the generality of residential users could be dissuaded from using the technology, and (b) the use of videotex systems for computer-assisted instruction would be contra-indicated or discouraged.

Nevertheless, the economy of packet switch networks have proved invaluable for operation of this trial. A comparison of cost between Datapac and direct distance dialling is useful. Assume that the cost of a Datapac connection for a site in London, Ontario is about $35/wk. This provides 20 hours connect time, 40 pages hour with an average of 4K bytes a page. The cost of direct distance dialling to Ottawa over a similar period would be $700.

The cost of the Datapac connection can be further reduced by installing of a direct line to the terminal. The advantage is that the $120 month rental fee includes modem rental and unlimited network holding time. The disadvantage is that the terminal is limited to connecting to the Datapac Network only.

In rural locations there appears to be no easy solution to the cost of on-line communication. The poor quality of the phone system and the distance from major centres demand the installation of conditioned datalines. The cost for this additional service can exceed $1000 a month in some communities. For the operation of this field trial we have accepted existing service on rural ines rather than pay for conditioning. The signal quality in rural areas operated in this way has ranged from acceptable to poor. The cost of long distance calls to either the host computer or to Datapac node remains prohibitive for these sites.

Access

Another hurdle to be taken is the current limitation on easy access over wired networks. At the early stage of network development encountered during the current field-trial, the sticking-point most apparent to this writer is the front-end communication hardware now deployed. Clearly, it shouldn't have to be difficult for a mere 50 terminals to access a data base at the same time. But it is.

Fortunately, the picture is changing. Only months ago , the best prospect for multiple simultaneous access was an X-25 front-end capable of supporting a reported 112 terminals all at once.

The price, in the neighbourhood of $20,000. We are now advised that another configuration will soon be on the market, permitting 255 simultaneous calls to a single host computer. Assuming 3 terminals are inactive for every "live" call, this configuration offers the prospect of 1000 terminals being supported by one front-end. Apparently more than one front-end can be appended. Cost per unit is not certain, although a figure of $30,000 per unit has been mentioned.

The situation is improving, but the limitations of access in any wired network configuration deserve close and continuing study. This writer concludes, tentatively, that a judicious combination of wired networking (including distributed databases and third-party access), broadcast distribution, and down-loading to terminals/micros offers the best prospect for a total service that is efficient, economic, and user-friendly. Clearly, a system that has those characteristics stands the best chance of gaining consumer acceptance.

Modems

Within the wider framework of hardware considerations, modems deserve particular mention.

Baldly put, throughout the trial, modem disarray has been a pain. All of the following were encountered:

- 202 ST half-duplex (1200/1200) modem

- 202 ST half-duplex coupler

- VADIC full duplex coupler

- 212 and 212A full duplex modems

- split-speed (150/1200) modem

- combination 300 and 1200 baud modems

Of these, only the 212A would connect with Datapac. On the
other hand, the 212A was not available in acoustic coupler
mode, a factor limiting mobility of deployment. At this
writing, reports are that the split-speed modem will be
supported on the Datapac network in future.

The move to connect split-speed with Datapac has important
cost implications. Until recently , the 212A retailed in
the neighbourhood of $1500, a not unreasonable sum in comparison
to the rental charge of over $100 per month, but nevertheless
a sum that exceeds the current cost of an entire videotex
terminal. By contrast, a price of $250 per unit has been
mentioned for the split-speed.

That's the way of the future. Let's return to the past.
In the early stages of the project Mk I decoders were using
the ½ duplex ports to access the Ottawa host. Field sites
were equipped with 202 ST modems and phone lines provided by
CCG. Demonstrations in the field were done using either Mk I
decoders and Anderson Jacobson 202 couplers or an EPS-1 and
a Vadic coupler calling the Vadic port on the Ottawa host.

The major problem with the ½ duplex connection to Ottawa was the enormous expense of long distance phone calls from sites located out of the Ottawa free call area. The cost was so great that many sites worked under a limit of 10 hrs. a month access time. We hoped the addition of eight ½ duplex ports on VISTA would have provided some relief for sites located in the Toronto area.

The ½ duplex ports on VISTA proved to be a disaster in our deployment plans. First, at the time VISTA became operational our field trial was converting to the Mk 3 decoders which only operate in full duplex. This meant deploying the less reliable Mk I decoders in the Toronto area and depriving these sites of the 4.6 megabit broadcast service. The second problem was a bug in the Mk I decoders communication program that prevented it from working ½ duplex in odd parity environment. These two circumstances made access to VISTA as it was configured impossible. In December 81-January 82 DOC, VISTA and TVO agreed to replace the eight ½ duplex ports on VISTA with 4 Datapac connections and a loan of 15 Northern Telecom decoders. To date TVOntario has deployed 4 sites using NTL decoder. The promised 4 Datapac ports have not yet appeared, access to VISTA being confined to the previous 3101 Datapac connection.

7.5 Inferences

7.51 Taken as a whole, the videotex technical system operated by TVOntario in 1981-82 -- IPS-2s with graphics tablets, auxiliary headering facility, distribution facilities -- demonstrated the practicality of the configuration, but also pointed up the hurdles that have still to be taken en route to an efficient and smoothly operating future system.

7.52 The up-grading of IPS terminals to include new software and a graphics tablet transformed page creation from a process marked by persistent frustration to one that meets the requirements of the operators for sophisticated imagery and for responsiveness to the needs of the workplace. This is not to say that everyone can use the system to great effect. Our perception is that while most people can learn to operate the equipment in a very short time, relatively few have the combination of graphic/ artistic aptitude, organizational ability, and sense of direction that distinguishes the effective communicator from the dabbler.

7.53 An aspect of the total system that deserves mention is the status and operation of data base management. A factor that impressed itself on our awareness was the effect of having to relate to operators whose priorities differed from our own. One can readily concede that those in charge of the VISTA host and those in charge of the CRC host have their work cut out to cover design, administrative, and technical aspects of operating their systems; but at the same time be uncomfortably aware of how often the needs of the field trial have to be

fitted into someone else's agenda. We knew what sort
of ports we needed, but we couldn't have them when we wanted
them. We knew what database sequences should be loaded by
specific dates, but we couldn't always have our way. We
drew two possible conclusions, -- either the operators of a
system should control the entire system, or the database
operation should be supplied on a commercial basis to meet the
objectives of the field trial operator.

7.54 Concerning carriage networks our conclusion is simple. They
must be up-graded. Data transmission must be more widely
available, and access hardware at the host must be much more
powerful. Failure to devise means to keep costs down and make
access easy will remove videotex from the mass market. As
indicated elsewhere, we believe that a combination of wired
videotex with broadcast carriage and down-loading will address
the problem.

7.55 With reference to user terminals, a program of field maintenance
and support is a must. We understand that Telidon terminal
manufacturers are beginning to make arrangements for service
agencies such as Dataforce to give prompt attention to hardware
problems faced by the user. Colleges of Applied Arts/Technology
would do well to assess the future requirements for technicians
to handle the needs of potential tens of thousands of users across
the province, with an eye to setting up short training courses.

7.56   As with user terminals, a broad-based program of field
        maintenance and support is a must for all Telidon creation
        terminals (of whatever type -- IPS, VIPS, PESO, etc.). To
        date, support services from manufacturers has been characterized
        by poor turn-around time due to a lack of equipment and
        qualified personnel. To support an active page creation
        industry, there should be a sufficient supply of trained
        technicians and spare parts available to service this industry
        within a one-day response time. For those operators with
        in-house technicians qualified in the technology, at least a
        sufficient supply of spare parts, for every component part of
        the systems, should be accessible within a 24 hour period.

7.57   It has become apparent that a multiplicity of users accessing
        the system simultaneously, has led to a noticeable increase
        in the length of system response time (after the user has
        logged on). Experience has shown that a wait time of upwards
        one minute is common, when accessing the CRC host. Given a
        large population of users (that may number in the thousands),
        it is not sufficient to simply supply enough ports to allow
        access to the database. The system software must also be
        powerful enough to respond quickly (within a maximum period
        of time such as 15 seconds) to requests; otherwise user
        tolerance levels will fall, and usage in general will drop.
        This factor should be kept in mind when designing or implementing
        system software, and steps taken to ensure optimal system
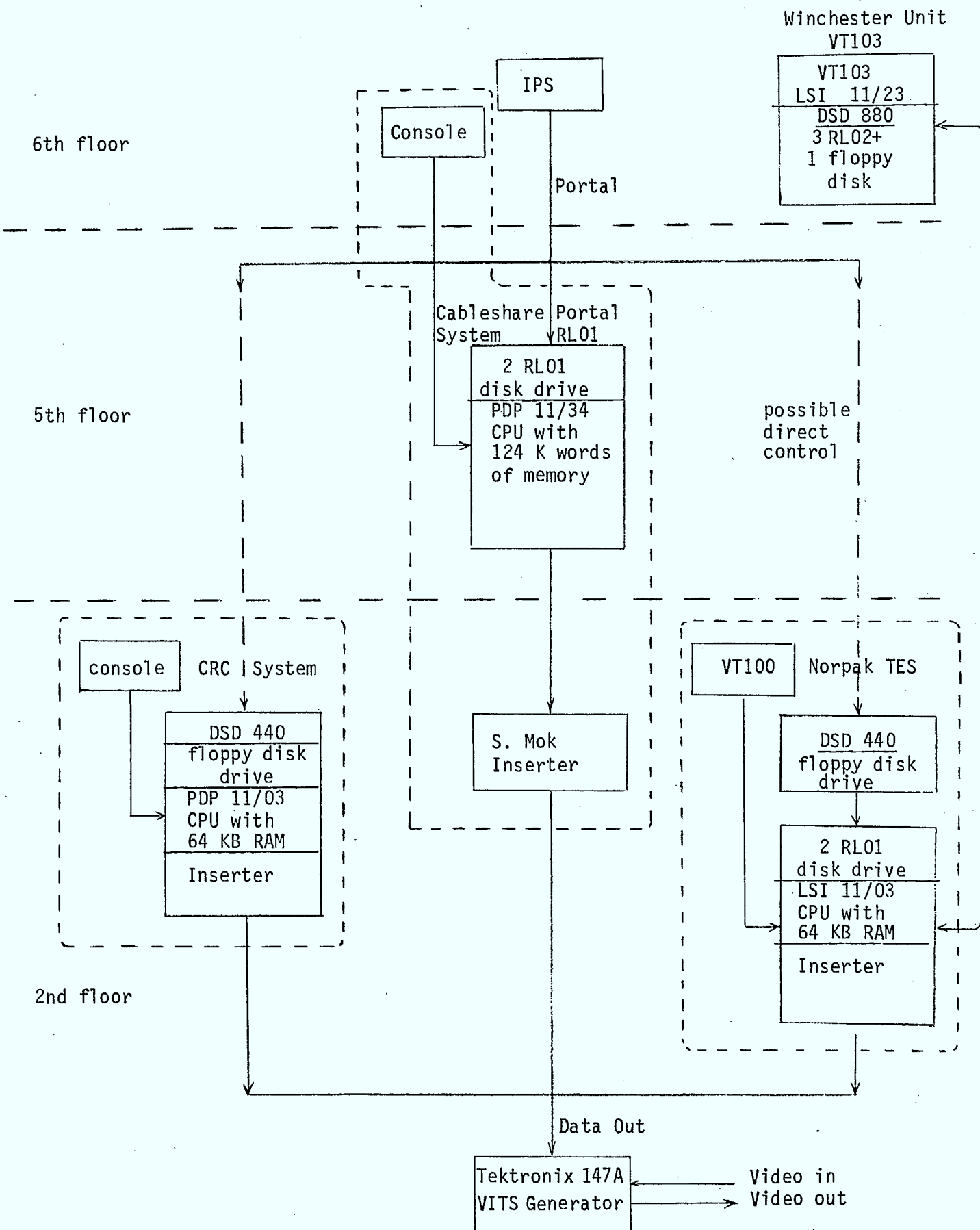   performance.

8. Technical System Operation: Broadcast

Broadcast Telidon, 81-82

The OECA as in the previous year, has broadcast a Telidon magazine
throughout the year, April to March inclusive. As a concomitant
of TVOntario's regular broadcast schedule, the Telidon cycle of
pages has reached wherever the television network has reached. From
April until mid-January, this has meant on-air exposure for 16 hours
per day (8 hours during 6 weeks of summer), interrupted only on
those occasions when plans called for a change in transmission or
when system failures surfaced and required attention. Subsequent upon
a change in bit rate transmission and the occurrence of associated
technical problems (discussed below), the Telidon cycle has been
broadcast from 8 a.m. until 4 p.m. Mondays through to Fridays. Even
given the latter constraint, the fact that TVOntario is simultaneously
conducting tests of satellite transmission of its TV service to 46
remote locations in Northern Ontario, has meant that the Telidon
broadcast has also reached and been tested beyond the range of the
terrestrial network. As teletext decoders have been deployed in diverse
locations (including the north via satellite feed), it has been possible
to achieve some assessment of the variability in reception in many parts
of the province, under a variety of reception circumstances.

8.1 Encoder/Inserter Configurations

    During the period April 1981 to March 82 inclusive, TVOntario
    operated at one time or another, three systems -- the CRC system,
    the Cableshare system, and the Norpak TES. These are shown
    diagramatically (see next page).

Winchester Unit
VT103

| VT103 |
| LSI 11/23 |
| DSD 880 |
| 3 RL02+ |
| 1 floppy disk |

IPS

Console

Portal

6th floor

5th floor

Cableshare Portal
System   RL01

| 2 RL01 disk drive |
| PDP 11/34 CPU with 124 K words of memory |

possible
direct
control

2nd floor

console   CRC System

| DSD 440 floppy disk drive |
| PDP 11/03 CPU with 64 KB RAM |
| Inserter |

S. Mok
Inserter

VT100   Norpak TES

| DSD 440 floppy disk drive |
| 2 RL01 disk drive |
| LSI 11/03 CPU with 64 KB RAM |
| Inserter |

Data Out

| Tektronix 147A |
| VITS Generator |

Video in
Video out

Components

A brief summary of system components for each of the three systems follows.

A) <u>CRC System (Hardware)</u>

- one PDP 11/03 computer with 64 K Byte RAM   (DEC)

- two floppy disks each with .5M Bytes of Storage (TRANSDUCTION)

- one CRT terminal as console   (Volker-Craig)

- one INSERTER   (CRC)

- one 147A NTSC test signal generator   (Tektronix)

- one Telidon terminal decoder   (Norpak)

- one modified TV (RGB) receiver   (Electrohome)

<u>Features:</u>

- user friendly

- small, reliable, but no scheduling

- 3.9 MB/second old bit rate not easily updateable

- files on floppy disk, small capacity

- limited cycle capacity, roughly 30 pages

B) <u>CABLESHARE System (Hardware)</u>

- one PDP 11/34 with 124 K words of memory   (DEC)

- two RL01 disks each with 5M Bytes of storage   (DEC)

- one LA36 DEC writer II as console   (DEC)

- one S. Mok line INSERTER   (S.Mok Engineering)

- one 147A NTSC test signal generator   (Tektronix)

- one Telidon terminal decoder   (Norpak)

- one modified TV (RGB) receiver   (Electrohome)

Features

- large, unwieldy and unreliable
- more flexibility in controlling database management function
  (scheduling by queue, TVO modification sort)
- 3.9 MB/second, not easily updateable
- files on hard disk, large capacity

S. Mok Inserter

- fairly large and reliable
- delicate
- larger cycle capacity
- frequency stability problems with digital signal
- bit rates are easily updateable

C) Teletext Encoder System (Norpak)

- one LSI 11/03 computer with 64 K Byte RAM   (DEC)
- two RL01 disks each with .5M Bytes of storage   (DEC)
- two floppy disks each with .5M Bytes of storage(TRANSDUCTION)
- one VT100 terminal   (DEC)
- one Norpak INSERTER   (Norpak)
- one 147A NTSC test signal generator   (Tektronix)
- one Telidon terminal decoder   (Norpak)
- one modified TV (RGB) receiver   (Electrohome)

Features

- very friendly
- very reliable with scheduling facility
- rugged
- files on hard disk, large capacity
- 4.6 MB/second, new bit rate, easily updatable
- virtually unlimited cycle capacity

Norpak Inserter

- small in size and very reliable

- unlimited cycle capacity

- excellent digital signal

- very flexible (closed captioning)

- fairly rugged

8.2 Problems Encountered

8.21 Encoder/Inserter

While the CRC was reliable and easy to operate, it was extremely limited in the service it could offer. The Cableshare system offered the potential for a larger cycle and more flexibility in functions (such as a queue facility). It was more complicated to operate, but could be controlled via operator console from the sixth floor (via communication links to the host on the fifth floor and the inserter on the second floor). It was thus more physically convenient that the CRC inserter which had to be operated on site (on the second floor). Due to recurring problems with the page scheduler program and the restart functions, the system was in a constant state of debugging well into the summer months; during this time the small system was in use. Once accepted however, the Cableshare system proved difficult to maintain as a reliable tool for offering a teletext service. Despite the assumed capability of the Cableshare system to broadcast at both 3.9 and 4.6 , there were still two crucial problems with it that led us to turn with a sense of anticipation to the third option -- the Norpak TES system. The Cableshare system proved highly

susceptible to operator error (it lacked failsafe routines to block out or cope with such basic errors as spelling mistakes) which were capable of crashing the whole system. In this way it was a very "unfriendly" system to use. Of much more critical concern, however, was the difference in speed between the two systems in terms of inserting pages in the active cycle.

Whereas the small CRC system could load a new cycle of 23 pages within 35 seconds (and to extropolate for a 230 page cycle if it had this capacity, the time would have been almost 6 minutes), the Cableshare system required much more time. Using Cableshare, it required (in the worst case) upwards of 2 minutes to insert one page and for an entire cycle of 100 to 150 pages, the time required averaged 2 to 3 hours, due to the sequential nature of the page insertion scheme. As well, the portal program used to load pages into the 11/34 proved troublesome in performance, despite some modifications by TVO staff to upgrade its reliability. On the hardware side, the inserter experienced difficulties: signal levels varied and the potentiometers needed monitoring for adjustment, and on occasion the memory boards required replacement. Given these problems, the system was in operation for only a short period of time until the third system was activated.

The TES system, although almost as sophisticated as Cableshare, solved the problems of excessive loading time, and has proved to be easier to use. The system can load a new cycle within 3 seconds.

A DSD440 floppy disc drive was added to the encoder hardware
configuration to facilitate the rapid copying of pages (created
and stored on floppy disc on IPS units) into the encoder's
hard disc. Its hard discs must be "squeezed" on a weekly basis
to avoid system overflow problems; its methods of encoding information
onto the VBI lines meant a redesign of the magazine structure in
order to optimize response time (with lengthier, higher memory pages
at the top of the magazine, with shorter, smaller sized units at
the end of the cycle) thus ensuring a better spread of information
throughout the 4 VBI lines). There has been a small problem with
one of the software routines associated with building a cycle in
the queue; however, it has not interfered with normal operating
procedures.

8.22 Transmission

Network complexity. The TVO network consists of a
master control feed from Toronto headquarters to 3
transmission chains. One is a terrestrial repeater link
that starts with a UHF broadcast from the CN tower, and is
repeated by transmitters in Paris, London, Chatham and
Windsor. The second chain uses a terrestrial microwave link
rented from Bell Canada. From Toronto, the signal is sent to
transmitters located in Sudbury, Sault St. Marie, Thunder Bay
and Ottawa. The third chain uses a ½ power transponder on the
Anik B communications satellite. Down links are established
at the head end of each community cable service. Through this
complex network, the TVO signal is accessible by 85% of the
population of Ontario.

Problems

Given the complexities of this network configuration, and the
lack of sufficient testing instrumentation and personnel, it is
difficult to assess the nature and levels of transmission trouble
that the Telidon signal may encounter. The signal has been
examined by wave form monitor at various decoder sites around
Ontario, at both 3.9 and 4.6 mbs. From these informal observations,
it is possible to suggest that the signal can be distributed
throughout the network without significant degradation of
signal quality. When signal problems have occurred, it tends
to be at the last link in the transmission chain -- the local

reception site transmitter or CATV, MATV end. At this stage, poor signal quality has been linked to temporary misadjustments to local transmitters. In the majority of cases, the local problem is a deterioration in the signal caused by poorly maintained CATV/MATV systems.

Shortly after starting the 4.6 megabit service, TVOntario received a rash of complaints about "noise" in the audio signal. The "noise" has been associated with this change to the higher bit rate. A complete discussion of this problem is contained in section 13.2 of this report.

Reception

Reception of the teletext signal has not been subject to any methodical testing. The unreliable performance of the Mk 1 decoder precludes the drawing of scientific conclusions about the quality and distribution of a 3.9 megabit service. The Mark 3 decoders seem to be reliable, but there have been several occasions where the teletext boards have been found inoperative. The complete lack of information from both CRC and Norpak about testing, measurement and adjustment procedures has been a handicap. A description of a teletext test procedure is given in section 9.1

Currently teletext operating at 4.6 megabit rate

has been received successfully under the following

conditions:

Direct off air: from CN Tower: Bloor Collegiate
                       from Ottawa transmitter: Broadview Public School

CATV: from CN Tower: UCC
                       from satellite: Marathon High School
                       Paris transmitter: Tillsonburg Public Library
                       Ottawa transmitter: Museum of Man

MATV: CN Tower: McMaster University
                       Ottawa transmitter: Maynard Public School

Satellite: Marathon, Terrace Bay, Manitouwadge

For a complete view of all locations known to be receiving

teletext at 4.6 megabits as of March 17/82, see map, following.

Legend / Legende

Legend		Legende
Channel 2	●	Canal 2
Other than Ch. 2 Ch. 2 unimpaired	■	Canal different Canal 2 inaccessible
Other than Ch. 2 Ch. 2 impaired	□	Canal different faible transmission au canal 2
Other	☆	Autre
Out of range	▲	Regions non desservies
Microwave	✳	Micro ondes
Cable package	◠	Bloc de programmation par teledistribution

/// 4.6 mbit reception
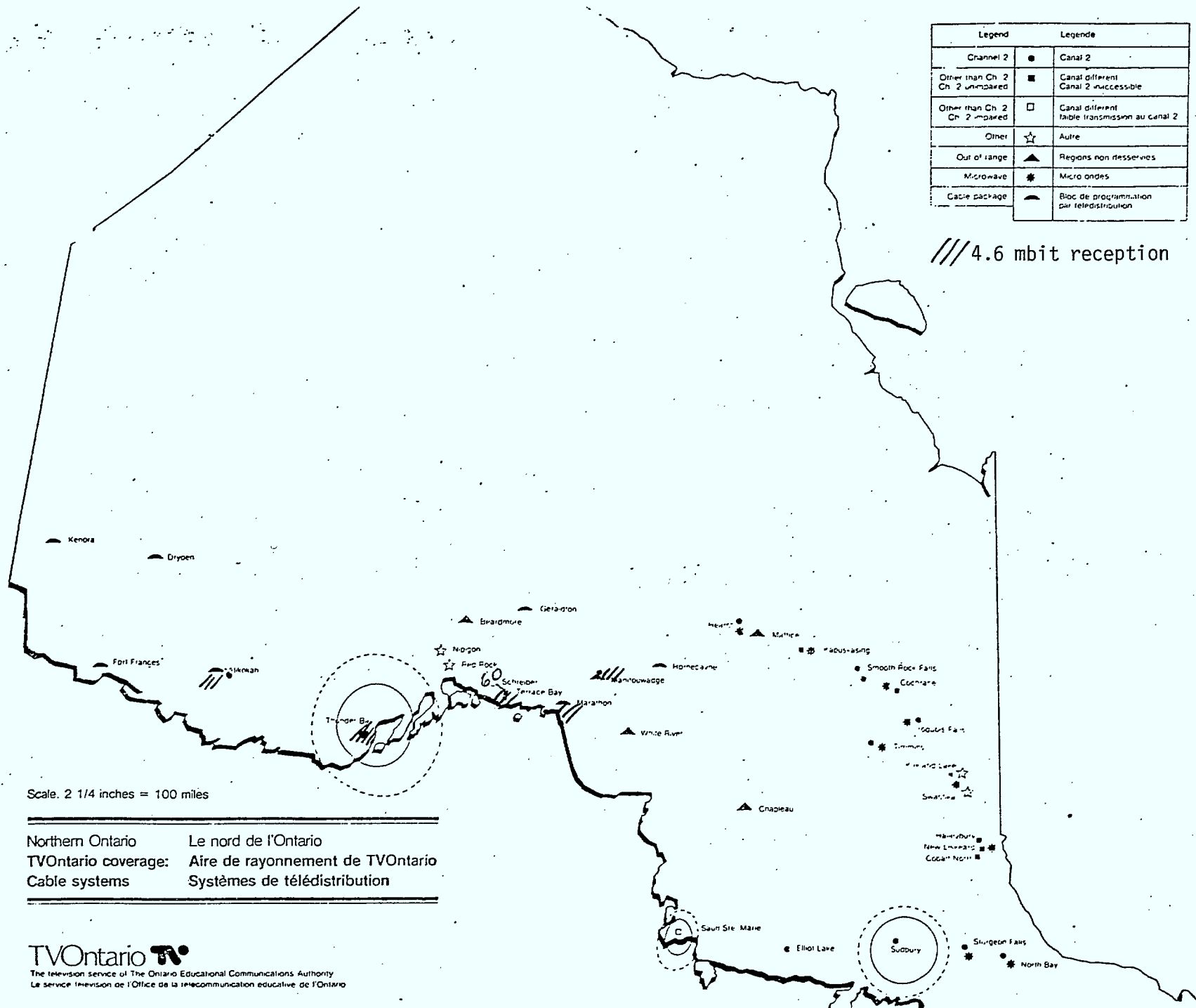
Scale. 2 1/4 inches = 100 miles

Northern Ontario   Le nord de l'Ontario
TVOntario coverage: Aire de rayonnement de TVOntario
Cable systems   Systèmes de télédistribution

TVOntario
The television service of The Ontario Educational Communications Authority
Le service télévision de l'Office de la télécommunication éducative de l'Ontario

Southern Ontario — Le sud de l'Ontario
TVOntario coverage: — Aire de rayonnement de TVOntario
Cable systems — Systèmes de télédistribution

Scale. 4 1/2 inches = 100 miles

TVOntario
The television service of The Ontario Educational Communications Authority
Le service television de l'Office de la telecommunication educative de l'Ontario

////4.6 mbit reception
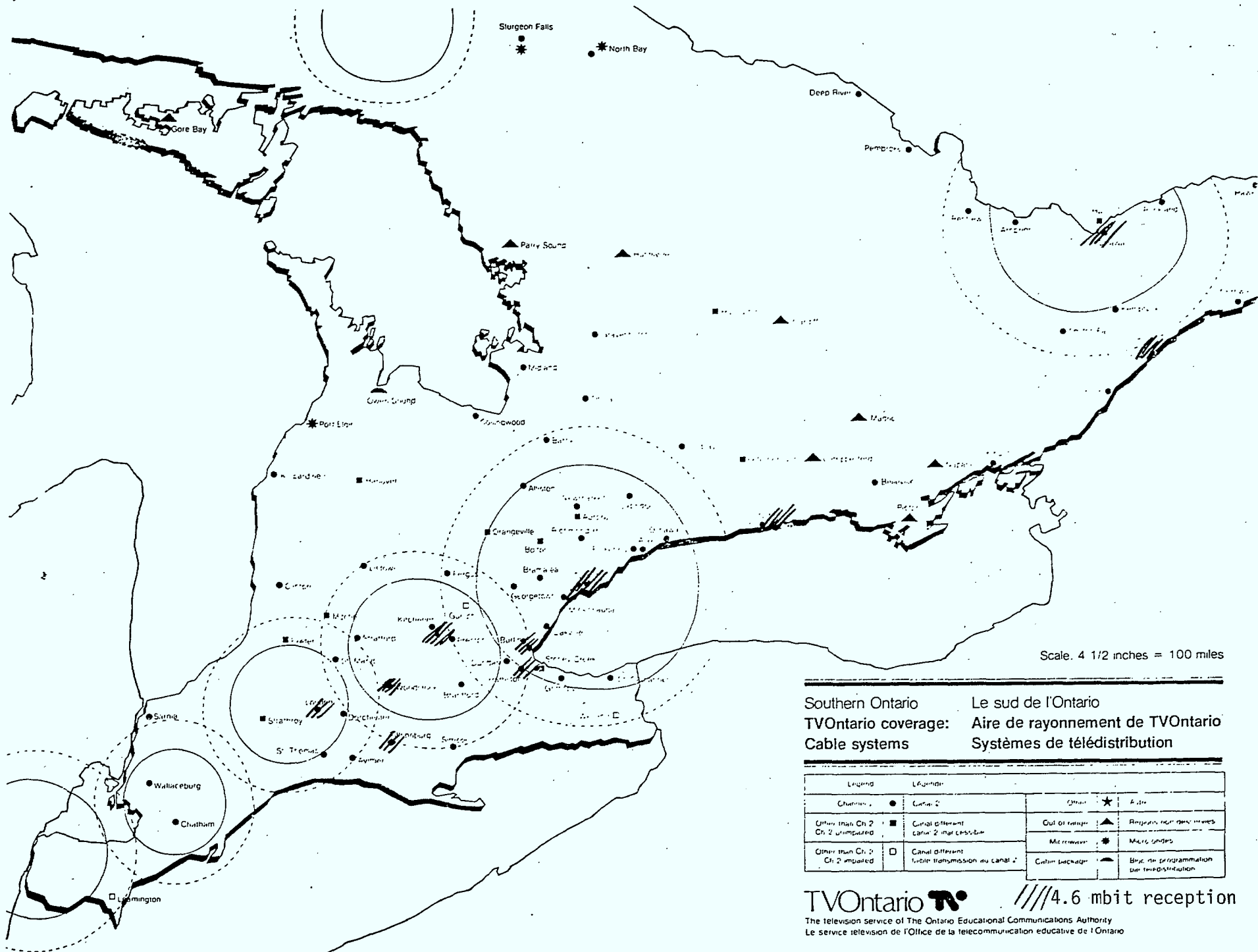
8.3   Decoder Performance

Performance of Mk I decoders was unacceptable. In August of 1981

Norpak provided TVOntario with prints and check-out procedures.

This information in combination with technique for teletext

alignment described in section 9.1 allowed us to optimize decoder

performance in the few instances where user decoders were functional.

The Mk 3 decoders have proved to be quite reliable in the videotex

mode, but since most of them were installed prior to the 4.6 megabit

encoder becoming operational, it has not proved possible to conduct

a thorough test of broadcast decoder performance. It seems that

the teletext board is not quite as rugged as the videotex. In at

least 3 sites the failure to receive broadcast Telidon has been

solved by replacing the decoder. At this time, the information needed

to fully test and diagnose the Mk 3 decoder is not available.

When the broadcast decoder board is working the functionality of

the service is remarkable. The current magazine cycle time is

approximately 16 seconds. Automatic capture of next page in a chained

document gives the user a response that compares favourably with 1,200

baud on-line access.

Several of the Mk 3 decoders were modified to allow the connection of

an RS-232 connection directly to the teletext board. Currently an

EPS-1 is linked to the added connection allowing the down-line load

of pages from the broadcast cycle. The EPS-1 then saves the pages on

cassette for better use in the field. This procedure has been completed

successfully at TVOntario and in the field using the satellite dish at

Marathon High School.

8.4 Information Interfaces

8.41 The Need

Given the demands of a daily service whose content must be updated frequently, there is an obvious demand for system components that increase the rate of retrieval of information from diverse sources and the deposit of that information into the broadcast host.

With this need in mind, we have explored a number of techniques to achieve this end. It has been an evolving process, starting with a simple ASCII interface, utilizing an Apple computer, and has progressed to the installation of a more powerful and sophisticated hardware/software package.

8.42 Interface, Phase I

An Apple, utilizing Starside software, with a micromodem at 300 baud, was our first interface. There were problems with slowness and awkwardness of editing, and rather limited storage because of the limitations of the 5¼" disk. More positively, however, this interface demonstrated the capablilty of accessing a host system. Using this interface, project staff collected information from the Student Guidance Information Service database.

Given indications that the interface was feasible but time-consuming, the next stage was to develop a better package for information retrieval.

8.43   Interfaces, Phase II

The project obtained an "intelligent" terminal from TRANSDUCTION:
a VT103 terminal with DSD Winchester Drive incorporating
hard disc storage.   Purchased also was TSX-Net software
(GABA) (See section 12.2) which permitted us to acquire, store
and edit textual information from distant databases.

Our increased ability to access and store large amounts of
information opened the capability to explore a broader range
of content sources.

8.44   Interfaces: Sources

Sources fall into two categories: time delimited services such
as the Executive News Service and the Atmospheric Environment
Service, and time flexible sources.

In time delimited services the recipient has a specific time
period each day to access information. This constraint emphasizes
the need for fast and comprehensive retrieval and storage
capabilities. Time-flexible sources such as the Current Events
calendar of the University of Guelph, provide current information with-
out locking the recipient in to a fixed retrieval time. There
is a small third category of somewhat static information (SGIS)
that can be retrieved at any time.

8.45 Implementing the Interface Sources

Within this past year, a number of diverse content sources were identified and access implemented. Among them were the Executive News Service feed from United Press International and the Atmospheric Environmental Service weather information from Environment Canada. We accessed current events information from Guelph University and course development information from York University (see section 6.3 for specific broadcast programming requirements). A link was made between our terminal and TVOntario's Hewlett-Packard 3,000. We also accessed the VAX 11/780 system of Ottawa's Museum of Science and Technology in order to obtain science information.

It was simple to capture information housed in a remote database if that information was packaged in "terminal format". The complexity of access increased dramatically, however, if the informtion was packaged in "record format". (see section 12.23 for more details).

8.46 Conversion of Text Files Into Telidon Pages

Once the capture of textual information was made, the next step was to convert ASCII text files into Telidon pages. This involves inserting Telidon formattting commands into external text files. A variety of editors can be used for this integration process; for example, the Norpak text editor, TECO, KED etc. It should be noted that the more complex editors require a certain amount of training: the benefit is that they are very powerful, and an expert can use them to edit a large bulk of material very quickly. The edited text files are converted into Telidon pages after being formatted automatically by the Norpak text composer program.

8.5 Inferences

The technical system operation of a broadcast service poses a variety
of problems. Some questions to be answered are:

- how labour intensive is the total set of activities?

- do the editing requirements dictate time-consuming staff training?

- has an expeditious conversion to Telidon pages been found for news,
  weather and stock market information?

- for a large operation, how many interfaces would be needed?

8.51 Setting Up:

Initially there is work involved by computer programmers to
analyze system configurations (communications protocols and the
use of special characters) and system operating characterictics.
At the host level there is a need for the programmer to learn
RT11 version 4 in order to train the teletext programmer/loader
and to trouble-shoot host software. Not only is debugging
time required, there must be ongoing support to do such things
as "squeezing" the hard disk. Thus, a number of people are
needed to set up a new system while somewhat fewer people may be
required to keep it running smoothly.

8.52 Storage:

When we first acquired the CRC encoder it was found to be easy to
use and the loading time was fast. However, its storage capacity
was still limited in overall terms; for our operational purposes
a larger computer was needed. Even with our current system, although
some material can be "banked" on the hard disk for use over the

period of a week, long term storage of content still must be maintained on fragile floppy disks. Providing larger disc capacity would help ease scheduling problems.

8.53 Software modification

Programmers are required to develop and maintain interfaces. Even after an interface has been achieved and the material is being utilized, the programmers must look for refinements to speed up the editing process.

8.54 Learning the editor systems

At the bare minimum, one person is needed to retrieve, edit and process the final pages. Although a background in TECO is very useful, a less powerful text editor could also be used. TECO requires a training period which might require two or three months but once the training has been assimilated, it is an easy and efficient editor.

8.55 Re-training

Based on experience to date, there has been a need for a continual in-house training as well as consultation with the hardware manufacturers and the software houses. There is a requirement, as this technology develops and changes very rapidly, that skills be continually upgraded at the programmer and operator levels.

8.56 <u>Personnel requirements</u>

One VBI system supporting one hundred pages, with a limited news service (10 -20 pages), needs one programmer and one operator to load and maintain the cycle. For a continual news feed - ie. changeable every hour - one operator,"Winchester", and IPS would have to be dedicated to this service. A second Winchester, operator and IPS would be required to other automated interfaces (assuming flexible access times so that retrieval could be spaced over a period of a number of hours).

To handle extensive retrieval on a semi-automated basis (Statistics Canada, SGIS, university calendars etc.) for a full channel service, the minimum resources needed would be three to four VT-103/ Winchesters and at least two more operator/inputters. For more fully automated retrieval and display of news and weather, a special software interface would have to be created or adapted.

8.57 <u>Original pages</u>

Since not all material is accessible via computer feed, resources must be set up for page creation, especially with regard to graphic information. All background pages (ie. formats, logos) must be created on an IPS unit. For certain types of content eg. <u>Special--</u> <u>Features</u> like <u>Tag the Flag</u>, staff persons well trained in graphics creation and text editing techniques are required. Therefore, to the resources required for automatic page creation must be added another IPS and two writer/designer/page creators.

8.58 Display Speed and Response Rate

In observing the rate of response to page requests, a comparison between on-line and broadcast access times points to some interesting factors. Given error free transmission, the broadcast system can respond to a page request within 18-20 seconds or less, given a 100 page cycle; average response time is generally 9 seconds. With errors, the time factor may be doubled or tripled, causing irritation at the user end. However, once captured without error, the broadcast page displays at a somewhat faster rate than a comparable on-line page. Although on-line page display is slower, it has generally been felt that overall access time would be faster. However, it has been noticed that a multiplicity of users accessing the on-line host has produced a significant slow-down in system response time. As a result, broadcast videotex may become the more responsive service of the two modes of distribution. If so, its appeal to viewers cannot be under-estimated.

8.59 Back-ups

In an operational situation, if a teletext service is to have real value its continuous accessibility must be included as part of the system design goal. Operators would do well to consider what measure of hardware redundancy may be adviseable in order to achieve assured service.

9   Utilization Support

    9.1   Technical Support

        Simply stated field support involves the establishment

        and maintenance of a physical environment that supports the

        various needs of the Telidon Terminal. It is easier said than

        done. The following account will give some idea of the particulars

        involved in field support.

        9.11   Physical Environment:

            The terminal requires adequate cooling. A location where

            direct sunlight, heat registers, or insufficient ventilation

            causes temperatures to rise will prematurely age components

            causing failure.

            In Winter, a unit that is brought in from the cold must be

            warmed up before powering on. The moisture that condenses

            onto a cold PCB can create short circuits that damage the unit.

            Static electricity can damage decoder and keypad. Locations

            with high humidity, anti-static mats or uncarpeted floors

            control static electricity.

            The terminal needs two ground 120 VAC outlets.

        9.12   Telephone Networks:

            The sites are currently equipped with 212A modems that operate

            at 1200 baud, full duplex, asynchronous. Modems and lines are

installed and maintained by CCG.   There are 4 access

paths that sites are using to connect to a host:

1) Direct local dial
2) Direct distance dial
3) Datapac public dial ports, local
4) Datapac public dial ports, distance

Establishing a direct local dial service involves ordering a

212A modem and IFB from CCG. The phone service in the Ottawa

area can support 1,200 baud speed without difficulties. Typically

the CCG representative will discuss the probability of such a

service with his technical staff. In some instances the

phone lines in rural areas are still using stepped exchanges.

The resulting noise limits the data transmission speeds to 300

baud or less. In these cases it is necessary to use a conditioned

line, run at a lower speed, or use permissive service. A

permissive service is a circuit installation where CCG does not

support the reliability of the line. In the case of one site it

was necessary to wait 6 weeks until a local exchange was upgraded.

Establishing a Datapac public dial service is possible if the

site is located within the local call area of a Datapac node

with a 1200 baud PDP. The CCG installs a 212A modem or IFB.

Usually in node centres the quality of phone lines is not a

problem. The difficulty with the Datapac service is that it

adds another layer of learning and possible component failure

(particularly prone are the PDP themselves). The cost saving and

error checking of Datapac service more than compensates for

the difficulties.

Establishing a Datapac public dial distance service suffers from all of the problems of direct distance dialling and a local PDP service. In many cases, the use of Datapac accounts for a saving of only 10-40%. The exception is the use of Datapac to provide service to 3 sites located on the north shore of Lake Superior. Here the phone lines would not support 1,200 baud. The three high schools call the 300 baud PDP in Thunder Bay and then connect to the Ottawa host. Using the Datapac system to provide 300 baud access to the host computer, where no provision for such a service is provided by the computer itself, allowed the terminals to operate in this region.

9.13 Broadcast Reception

The complete absence of test and measurement devices has necessitated an empirical approach to installation of the teletext service. At least half of the sites with Mk 3 decoders were installed before the 4.6 megabit encoder was operational. This means that some decoders in the field have never been tested in the teletext mode. It is difficult to determine if the failure to receive teletext at a given site is caused by a bad decoder or poor reception.

A "jerry rigged" test set was used when installing Mk 1 terminals. A description of its operation provides a model of the type of instrumentation that teletext field support requires.

1) Known good decoder
2) Known good Electrohome TV
3) 3/4" Sony VCR
4) 3/4" video cassette recording of TVOntario broadcast signal including VITS and teletext.
5) Teketronic 468 wave from monitor.

The decoder and TV are set up in the desired location. The video cassette is played back with the video o/p from the VCR connected to the video i/p on the decoder. The wave form monitor is sync to the clock run in monitored from the video o/p, the data out signal the decoder is displayed on the wave form monitor. The slicer level trimpot is adjusted to give a symmetrical wave form at the data out. The decoder is tested to see if it can read pages from the signal.

If the decoder works, the video i/p of the decoder is connected to the REC o/p on the T.V. The video o/p from the VCR is disconnected from the decoder, the RF o/p from the VCR is connected to the RF i/p on the T.V. The data o/p from the decoder is monitored and the slicer level is checked and adjusted. The decoder is tested to see if it can read pages. If it can a functional teletext terminal has been established.

The T.V. is now connected to either its antenna or cable feed. The wave form monitor can be used to examine the video signal o/p at REC on the T.V. Fine tuning the T.V., adjusting the antenna or calling the cable company are means of improving signal quality if the terminal cannot read the real time signal.

Since there is no portable source of 4.6 megabit teletext for test purposes, the procedure for installing teletext is a go/no go situation. The wave form monitor can be used to examine the video signal o/p and REC allowing for fine tuning, antenna adjustments, etc.

9.14 Education

When the terminal is installed at the site and functioning correctly a presentation on operating the terminal is given to interested staff and students. The 3 aspects of the system to be learned are:

- the terminal
- the data communication network
- the Telidon host procedures

The Terminal

The Mk 3 decoder contains several serious bugs that interfere with its convenient operation. The machine does not report what mode (videotex/teletex) it is working in. When it is powered up the 0.0 search locks out mode toggling commands. As a result a special keypad sequence is required to initialize the decoder in the videotex mode. The frustration of dealing with this special keypad sequence has resulted in many unsuccessful attempts due to operator error. In addition, if the Mk 3 decoder is switched to teletext from videotex the unit does not consistently respond with a search for pages.

A description of the procedure for using the terminal is outlined in the User's Handbook left with every site. This procedure is demonstrated. The people are encouraged to try it out.

Datacommunication Network:

After dealing with the operation of the terminal,
instruction is given on how to use the modem and the
telephone to access the host computer. Sites are shown
alternate strategies for getting onto the system:

- Datapac to Ottawa host
- Datapac to Vista in Ottawa
- Direct dial to Ottawa host.

(The different procedures that each route uses often requires
some rehearsal time.)

The Telidon Host Procedures

Having connected to the host, site account numbers and passwords
are assigned and an introduction to the keypad functions is given.
Work on the utilization of the database is not undertaken at
this time. The people are left to explore the database themselves.

At two sites keyboards have been deployed to allow the terminal to
connect to the NATAL CAL host at the NRC. In one school, some
staff members had recent training in NATAL at NRC; at the other
school, an NRC staff member visited the site to provide instruction
to the teacher.

HELP

The first line of assistance to sites is a section in the
Users Guide that outlines a troubleshooting procedure. Should the
procedure fail to solve the problem the user is directed to
telephone TVO for help.

There are 3 main areas that can be tested over the telephone. The correct operation of the terminal, functionality of the data lines, and the operational status of the host computer.

Problem types are:

1) operator error
2) communication network faults
3) host ports full
4) host not operating
5) hardware fault on terminal

1) Most early complaints result from operator error, setting the switch the wrong way, not initializing the decoder correctly, etc. These are easily corrected over the telephone.

2) If a fault is suspected with either the modem, phone lines or Datapac, then the service telephone number included with each modem is called. CCG procedures are followed to troubleshoot the problem. In urban areas there are fewer data network problems. The most common one is noisy phone lines and PDPs not working.

3) Blockage at the host computer has increasingly become a problem. The limited number of ports and the long holding times of educational users has tended to create bottlenecks.

4) Increasingly, down time on the computer has been an inconvenience to test sites. Usually these crashes are short term but they erode user confidence in the system. The Datapac ports have proved to be particularly unreliable on the Ottawa host. The slow response time during heavy traffic periods gives the impression of system failure to many users. The method for handling host computer problems is to call the operator and alert them to the situation.

If the system is just slow or overloaded that information
will be passed back to the field site.

5) If it is determined that a terminal has failed, a replacement
    unit is shipped to the site and installed as soon as possible.
    Typical wait time is one week for replacement.

An additional problem encountered with the Mk 3 decoder has been
the overscanning of the display on Electrohome televisions. To
date, no solution has been found. This problem still awaits
a solution from CRC, Norpak and Electrohome.

9.16 Extent of Support

Field support has been extensive both in the time spent
on sites and the distances covered to deploy terminals to the
sites. In the 6 month period, between July and December 1981,
over 50 field service calls were made to install, maintain and
demonstrate the system. An average of two phone requests for
assistance have been received every working day; the time it
took to solve the problems ranged from 5 to 120 minutes. Sites
are located across Ontario. Personnel have driven over 1000
kilometers to install terminals in Northern Ontario, rode
skidoos to mountain tops to examine satellite down-links and
made weekly trips throughout southern Ontario to provide
the minimum level of support necessary.

9.2 Field Liaison Activities

Once content has been created and the decoder has been installed, the liaison staff must support the participant's needs and provide them with information and advice in the following ways:

i) cultivate a level of mechanical competence by visiting the site shortly after installation to teach the user group the functions of the hardware and to demonstrate Telidon and provide them with background information.

ii) support the participants' needs for the duration of the trial through regular personal contact and the distribution of supplementary aids and promotional material which make the technology more useful and keep the participants up to date. In many instances this involved demonstrations and personal visits to build their confidence in the new technology.

iii) make recommendations for classroom activity at school sites in order to maximize the benefits of having Telidon on the premises, and to direct users towards pertinent material created by other schools, so that there is information exchange at the participant level.

iv) prepare participants for the initial contact of the evaluation team and keep them informed and involved throughout the evaluation process.

v) maintain close contact with sites involved in special activities (eg. Telidon-NATAL testing at the University of Waterloo) so that all sites can benefit from their experience.

Activity at this level was carried out at 46 sites in 1981.
This involved at least one personal visit to each site,
although most sites required two to four visits in
order to satisfy their needs regarding demonstrations and
consultation. The utilization staff became the participants'
main contacts at the Telidon project, and so they gained
familiarity with all the activity in other departments which
was pertinent to each particular site, and indeed they
became support persons making participation in the field
trial as beneficial, pleasant, and enriching an experience
as possible.

9.21 Field Liaison Activities for Special Applications

Special applications require greater liaison activity
for the following reasons:

1) to assist in defining objectives in the field,
2) to assist in suggesting possible applications in
   special contexts,
3) to assist in actual implementation of the application,
4) to act as a source of "support" in the endeavour.

We have found that the last aspect is perhaps the least
obvious yet most important to our participants. The
activities of some of our participants in special applications
are outlined below.

1) Ontario Federation for the Cerebral Palsied

Participants in the field trial live at the Bellwoods Park
House. They use the content created especially for them
(material related to their special needs) on the database.

A teacher from the Toronto Board of Education visits Bellwoods regularly to provide special instruction. In conjunction with a liaison field officer, the teacher is exploring the use of Telidon as a tool to aid her instruction of basic language skills.

2) <u>The Toronto Institute of Medical Technology</u>

The Toronto Institute of Medical Technology is interested in exploring Telidon's graphic presentation and networking capabilities in order to assess the suitability of the technology in the delivery of medical information to geographically remote areas. The terminal was deployed in the media resource centre. Students in the radiography and nuclear medicine courses were advised that a self-instruction unit was available for their perusal. Over 120 people looked at the sequence "Areas of the Abdomen and Body Types". Of this number 39 were students and 31 were instructors. These users found the graphics to be the best part of the system and 90% felt that the technology was suitable for self-instruction.

The T.I.M.T. participants' commitment to Telidon has been demonstrated in their willingness to attempt new applications independently and in the formulation of content plans for the future. They are currently investigating the possibility of in-house production and/or the sharing of resources with community colleges.

3) The Ernest C. Drury School for the Deaf

The Ernest C. Drury School for the deaf in Milton joined our
field trial to test Telidon's potential in the area of
learning difficulties faced by the hearing impaired. In
particular, there is a critical shortage of remedial
instruction in reading for the deaf. Participants from
the Drury School designed a sequence aimed at sharpening
reading skills. The Drury staff hopes to integrate Telidon
courseware into the school curriculum at all levels. This
will be tested during the April to mid-May period.

A present, the Telidon terminal is at the Drury students'
disposal outside of classroom time. The students prefer the
broadcast mode because it is easily accessed and its content
is clear and simple to read. This special application of
Telidon requires a greater effort in time and organization
from teachers. Thus, from their point of view assistance
from TVO's liaison staff is seen as both desirable and crucial
in the implementation of such projects.

9.3 Print Support

The various types of print support were designed and
written in response to participants' needs. Basically,
the documentation produced relates to the different phases
of field trial activity:

1) Telidon and Education User's Manual

This is the principal reference document for the
participants. It contains information on: participation
in the trial, user terminal installation and operation,
trouble-shooting, utilization suggestions, creating
content, evaluating material and action for assistance.
Appended are a number of forms, charts and diagrams to
illustrate the more difficult aspects of field trial
participation. Due to the upgrading of equipment in
mid-year, this document had to be re-issued with
substantial changes.

2) Contents Listings

At the start of the field trial we assumed that a print-out
of the table of contents would be a crutch that might
dissuade the participant from using the indices on the
system. Repeated requests for a print table of contents
caused us to change our tactic. Content lists were sent out
periodically cautioning users that it might be out of date
and urging them to consult regularly the table of contents
on the system for the latest listings.

3) Telidon and Education Update

This document was intended to be our newsletter; however,
the work load on project members made it impossible to
produce on a regular basis. As a result, Telidon and Education
Update appeared when it was necessary to convey information

to field trial participants. It informed them of the latest happenings in the videotex world and, more particularly, explained the reasons for delays or the changes that would be effecting them. Database updates were also included. The newsletter tended to give participants the feeling that they were part of the test group rather than an individual site.

4) Papers produced by project members

Participants often give presentations themselves and consequently are eager to have access to any information that is available. This need coincided with the production of papers being written by project members for various conferences or journals.

In response to participants' requests print material has been developed to facilitate evaluation procedures:

1) Content Summary (with monthly updates). A comprehensive listing, by educational level and subject area with page numbers and brief description, of TVOntario content on the DOC and VISTA databases. This document provides participants with a reference point from which they can both select material for use and plan their content assessment activities.

2) Guidelines to Participants' Report. An optional outline for participants needing some structure for the documentation and analysis of their experience with Telidon.

3) Answer Sheets. Forms (English and French) necessary for completing on-line questionnaire. Over one thousand have been distributed to sites.

9.4 Database Support

Utilization staff maintains a link between the participants'
needs and requests and the material which is on the
databases. This involves:

i)   explaining the system of indexes which preface
     the TVOntario database and facilitate the user's
     search for information.

ii) making use of teletext's dynamic nature by supporting
     requests for special material to be available for
     teaching at a predetermined time, and by ensuring
     that each site is able to actually make use of
     teletext on a "free of charge" daily basis.

iii) keeping participants informed as to changes of content
     in the Department of Communications, VISTA, and teletext
     databases.

iv) personally visiting each site to aid the principal users
     during their initial explorations of the databases in
     order that they have a sound general knowledge of the
     content which is available.

v)   informing each participant about material which would
     be especially useful at that site (eg. demonstrating
     "Qui?" at Francophone schools and to French teachers).

vi) Maintaining an exchange of ideas about the databases
     with all participants so that they understand the
     limitations of numerical menu-based Telidon and so that
     the Telidon project receives some feedback regarding the
     esthetics and applicability of the databases.

Through this activity, the content of the TVOntario databases is
constantly changing and being augmented by new material, thus
reflecting the educational needs and interests expressed by
the participants.

9.5   Inferences

9.51   Technical field support

1. Field technical support is critical to the operation of a Telidon service. If sites are scattered throughout the province the task of technical support becomes very demanding.

2. The efficiency of field technical support is directly related to the user's confidence in the system.

3. Portable field test equipment for teletext is urgently required.

9.52   Utilization support

1. The need for ongoing user education provided by field liaison personnel has been clearly established.

2. Even after having gone through the process of creating and inputting content, most participants do not know how to utilize the technology in their school setting. Therefore, the need to have different utilization models and to discuss this aspect thoroughly with the school staff is critical.

3. Print support is seen to be a current necessity in order to "comfort" the participants and assuage their fears about using the system.

10. Evaluation

10.1 Approaches, Instruments

The Telidon and Education field trial participants have been grouped into four main categories: 1) Elementary and high schools; 2) CAATS and Universities; 3) libraries; 4) miscellaneous or special applications. Although these divisions have simplified the delegation of responsibility for liaison and research officers, diversity in the nature of application and level of activity at the sites has persisted in spite of category. That is, the Telidon experience is unique to its user or group of users and it is this facet which has confounded efforts to generalize a model for evaluating the medium.

The difficulty of evaluating many sites, each employing Telidon within a unique context, has been met by a two-level approach involving in-depth testing at selected sites and more general data gathering across all sites. Project Research personnel have defined six main areas of focus for the evaluation. These are, with greatest emphasis on the first two areas: 1) utilization

2) learning impact

3) patterns of use

4) sequence or content assessment

5) perception

6) technical aspects

The research team has been committed to maintaining standards acceptable to Social Science research methods, for example, controlled testing. However, as the medium has posed new questions to educators so has it puzzled its evaluators. In certain situations, for example, where a teacher has created his/her own Telidon material and then has participated in the assessment of database content, bias has been an expected component of the evaluation. However, in this trial period, the demands of the medium for a creative approach in evaluation have yielded important results.

The instruments that have been used throughout the evaluation are 1) initial telephone interviews with the primary contact at a site e.g., school administrator, teacher, professor, media director etc.; 2) personal interviews at sites with the primary contact and a body of users after a Telidon session (this could range from a classroom application, to a small group project in the library, to a simple demonstration of the technology); 3) questionnaires aimed at specific audiences in particular applications; 4) more general

questionnaires on both broadcast and on-line Telidon
aimed at an audience of individual users in an
uncontrolled context; 5) and finally, self-reported
findings of participants including log-books recording
patterns of use during the field trial. It should
be noted here that some participants have developed
their own instruments for evalutaion. For example,
Professor Schaffir, from York University, has designed
a sequence testing "Pattern Perceptions" which he
will administer in several different contexts: at the
elementary school level, at the School for the Deaf,
and at Centennial's Clinic for Upgrading Reading Skills.
John Bradford at Mohawk College has designed a pre-test/
post-test for participants willing to assess the
learning impact of "Video Flow", a sequence produced
by Mohawk teachers and students.

10.2   Co-ordination of liaison and research
The number and the diversity of sites now fully
operative (over 45 at the time of this report) has
required a general increase in liaison activities
between Telidon Project staff, Research staff and
participants in the field. We have found that
utilization activity in the form of developing
specific applications at a site or defining groups
for comparison, etc., is a crucial step before
introduction of the research team.

A concomitant area of activity has been liaison between Project staff and researchers in the form of assessing and scheduling participants' readiness for evaluation procedures. A model for evaluation scheduling has emerged whereby levels of Telidon activity are reported by Project staff to Research staff. Any significant developments in the field have been monitored by means of a common "Site Report" form.

The initial telephone interviews conducted by the research team indicated those sites requiring further technical assistance, those sites where Telidon had been successfully integrated and those sites where a terminal was operative but underused. While the research team introduced evaluation plans at active sites, liaison activities were intensified at less active ones.

The results from initial visits suggest that the sites with a high-level of interest in Telidon are responsive to in-depth testing. In order to avoid discounting relatively inactive sites as unimportant, a common questionnaire, more general in scope, has been designed by liaison staff and reviewed by research staff.

This questionnaire is aimed at the individual user, the Telidon browser, at any site. In this way, we have attempted to cover all potential users of Telidon in the educational environment. The system questionnaire (called such because it is on the database - users fill out answer sheets) focuses on accessing methods and difficulties, page instruction clarity and the user's likes and dislikes in relation to particular sequences. A similar questionnaire has been designed for the teletext service .

10.3   Preliminary Findings:

After completion of telephone and personal interviews it has become clear that our field trial participants fall into yet another two subgroups within the general "active" and "less active" groupings. These are users who are learning with Telidon, broadcast or on-line, and users who are learning about Telidon, broadcast or on-line. The first group is found primarily in schools and some special education applications. The second group is not as easily described because levels of knowledge about Telidon vary signigicantly. Users learn about Telidon by browsing through the data base at their local library, they might learn more by attending a special demonstration and even more by creating pages for the data base.

For the most part, implications and conclusions concerning Telidon in the educational environment are being drawn from the first group - users learning <u>with</u> Telidon. The findings of in-depth case studies will be available in our June follow-up report.

Since our preliminary research in June 1981, technical complications are still named as a major obstacle to acceptance of Telidon in its present incarnation. Although there has been a marked decrease in page interruptions, garbled transmission and hardware breakdown, a general increase in use has made busy signals, slow retrieval and display of material, and data base crashing more frequent and consequently more bothersome. However, in spite of technical difficulties, educators and students remain optimistic. According to the librarian at Regiopolis-Notre Dame High School, "Frustration and technical problems were outweighed by the interest and enthusiasm displayed by all of us who were able to make use of the equipment."

The most frequent complaint from participants has been the cost of the telephone connection for on-line Telidon. Many participants have limited their use to the hours covered by the Project budget.

Where Datapac service is feasible, cost worries are appeased. Many educators look to the broadcast mode as a solution to the Telidon cost problem.

In terms of database content, there is a mixture of positive and negative responses. In most cases, participants feel that existing content is inadequate --not curriculum - specific, too slow in displaying, repetitive and unclear in educational objectives. However, participants do agree that the potential for better content exists and are quick to point to successful sequences, --designed for specific application and audience, careful balance of graphics and text, no "decoration" of pages, greater interaction.

In sum, the experience of project team members visiting participating schools and libraries has been that despite early deficiencies in the system and the service, Telidon is being accorded prominence at the various sites, and potential users, whether students, staff, or the public, are following its evolution with interest and optimism.

11 Promotion and Educational Liaison

11.1 Types of Activities

TVOntario engages in a range of activities aimed at educating, informing, promoting, developing and sharing information concerning Telidon. More specifically, activities have increasingly come to focus on the uses of the technology in the field of education and in broadcasting, on content of an educational nature and conceptual system development. Efforts in this regard may be grouped under the following four categories.

11.11 Educational

Activities involving the educational community in Ontario and our test sites in particular have taken the form of demonstrations of the technology and an explanation of the differences between micros and videotex. Whether occuring informally at TVO or at a school or placed within the more formal setting of seminars, workshops and conferences, the demand for "show and tell" continues to increase. (We often have the feeling the absolutely everyone must have seen it by now!) Despite the increased number of companies, organizations and our own test sites giving demonstrations increasing demand for presentations at professional development days and professional association conferences continues. Support of the field sites has ranged from demonstrations of the technology to work on the database content and applications with teachers and students during evaluation.

Of special note is the Lake Superior project. This project involves three high schools in the isolated northwest part of the province (Manatouwadge, Terrace Bay, Schrieber). The geographic isolation of these sites meant that two project members spent one week setting up the sites and deploying equipment. The presence of these two members was the occasion for inpromptu demonstrations of the technology for the business and general community as well as teachers and students. The schedule became one of installation, demonstration for the rest of the day and early evening and then travel to the next site where the process was repeated. When the week ended most everyone in those communities visited had seen and learned about Telidon and the field trial.

Many of the sites in our trial have become major centres of activity in their own right. For example, Carleton University Guelph University, the Faculty of Library Science at the University of Toronto, Algonquin CAAT, M.M. Robinson High School and the Lake Erie Regional Library System are a few who have undertaken to give demonstrations on a large scale. Institutions such as these and others have evolved from the nascent stages of participation in the trial to applicants and in some cases, recipients of IISP funds to establish their own activities. The University of Guelph, Laurentian University, Sheridan and Algonquin colleges fall into this category.

The case of Loyalist CAAT merits special mention. Loyalist participated in our trial during the first year (1979-80). Problems with the equipment and internal politics at the college led to the termination of their participation; however, dialogue with various faculty members was continued. As a result, the college's commitment to offer courses related to the Telidon industry has been encouraged by us. A major presentation to the faculty and membership on the Loyalist Advisory Board for Telidon reflect the TVO support.

In connection with our own plans for the establishment of an operational service after the field trial phase, a survey was sent to all the school boards in the province inquiring whether or not they would be interested in purchasing a Telidon terminal subsidized by IISP funds and a special provincial legislative grant. The questionnaire piqued the interest of a few hundred administrators. Their querries led to an increased appreciation of the Telidon system (including communications costs) and its relationship to micros. Over one hundred have indicated their desire to purchase a terminal.

11.12 Promotional

Activities that are not directed towards the Ontario educational community or field trial participants are deemed to be promotional. Throughout the past year several hundred national and international visitors have come to see our teletext operation and to discuss work done in the field of education. Prominent among the

international visitors was the Australian Minister of Communications. Delegations from Japan, Australia, Italy, Germany, France, Switzerland,Saudi Arabia, Israel, Britain, Brazil, Belguim, Seden and the U.S. spent time with us. Visitors from other provinces are too numerous to note; it suffices to say that we are in touch with the educational and broadcasting communities in all the provinces.

Besides receiving visitors, members of the project team have been invited to participate in international missions. These included two visits to Australia: one, to present a paper at an educational conference and tour remote parts of Queensland, the other, to visit various groups interested in the educational potential of Telidon and to assist in demonstrations to senior Australian government officials. Several trips have been made to the U.S. to discuss teletext with American broadcasters, government administrators and professional associations. More recently, a group of teletext experts (CBC, CRC, TVO) made a quick tour of several European cities in Belgium, Luxembourg, France and Italy, to assess the degree of interest in broadcast Telidon and to recommend ways to address that interest.

The relative stabilization of software and hardware during the year enabled the project team to concentrate on field activities. As a result, less emphasis was placed on participating in international shows. Notwithstanding, equipment and specially created content were lent to Infomart to enable them to display broadcast Telidon at the National Cable Association conference in Los

Angeles and the National Association of Broadcasters' meeting
also in L.A.

Participation in Videotex '81 constituted the major activity for
TVO at international shows. The designing and staffing of a
booth displaying teletext, on-line and Natal (CAL) educational
applications resulted in a number of contacts and favourable
comments. One outcome was the exchange of some TVO sequences
with Times Mirror in return for their research findings. Also,
TVO field trial participants were offered free general admission
tickets in order that they might explore the broader international
environment of videotex. About 150 took advantage of the offer.
Finally, the recent establishment of a TVO office in Dallas, Texas,
will assist in the dissemination of Telidon and Education
material in the U.S.

An increased awareness of micros, graphics and new technologies
in education has prompted many requests for contribution of
articles. As a result, a section of chapter 5, "Making Pages
at OECA" in The Telidon Book (ed. Godfrey and Chang) and
articles in the Canadian Journal of Educational Communications
(vol. 11, no. 2, winter/82), Computer Graphics World (Jan.,1982)
and Instructional Innovator (Feb.,1982) were published.
Many requests for more information and cost quotations of
equipment have been received. Where appropriate, requests have
been forwarded to manufacturers for follow on.

An area of great interest to us is the exchange of pages of content with others. Only those pages created by TVO may be exchanged since it is our policy that copyright of content created by others in the trial rests with those IPS. Content has been exchnaged with the WETA teletext trial and Times Mirror in the U.S. In Canada, a selection of our content has been bartered with Manitoba Tel, N.B. Tel, Maritime Tel and the University of Waterloo. As well, a major portion of the TVO database is available to users in the Bell Vista trial.

11.13 <u>Organizations/Sharing of Information</u>

Since its inception, TVO has participated in the Canadian Videotex Consultative Committee (CVCC). Chairmanship of the Educational Sub-Committee and the CSA Standards Committee resides with TVO. Participation in the marketing, teletext, social policy and standards sub-committees as well as working groups of those sub-committees has afforded TVO an opportunity to obtain and to share the information and experience that it has gained during the past three years.

Chairmanship of the CVCC Education Sub-Committee has provided several challenges. The terms of reference of the sub-committee extends membership to any interested party in Canada. In practice, a manageable organization had to be formed in order for the group to function. The problem was compounded by the fact that education is a provincial jurisdiction and the CVCC is a federal body. A conference to establish the CVCC Educational Sub-Committee was held in Toronto last April. Organized by the Association of

Community Colleges, DOC and TVO, the conference was attended by some 150 educators and provincial government officials from across Canada (at their own expense). During the day and a half, presentations on a number of issues were made and displays of different hardware accessing different databases were provided. Events culminated in the nomination of representatives from six geographical areas (four per area) and two representatives chosen from national organizations. The executive committee (consisting of the chairman, two vice-chairman and regional chairman) has met six times during the year to form objectives and policy statements. Each region has sponsored a conference to discuss videotex and its implications in the educational community in that region. Information from these conferences has been channelled back to the executive committee for presentation before the CVCC.

TVO has contributed information to national and international forums. Input through working groups of the CCIR, ISO and CSA has been one way of consolidating our experience in the technical and operational areas.

One of the original members of the Videotex Information Service Providers Association of Canada (VISPAC), TVO is represented on the executive committee. VISPAC provides the forum for IPS to share information and TVO has been active on the standards sub-committee, the good practices working group as well as contributing to the general direction of the organization.

11.14 Developmental

As an educational broadcaster, TVO has been interested for some time in the potential of Telidon as an inexpensive means to produce graphics and characters for TV production. A rather static presentation of graphics for a weather programme was produced in cooperation with the Atmospheric Environment Service (AES) nearly a year ago. It was shown to a session at the Canadian Cable Television Association meeting last year and received very favourable comment (notwithstanding the technical imperfections). Since then, technical plans and developments have been undertaken to produce a more dynamic, high resolution NTCS presentation via Telidon. Word of these efforts have prompted many companies and organizations to contact us for further details. The interest level is very high. Also of interest to us is the development of Telidon graphic content to supplement TVO produced television programmes e.g. Read Along.

In nascent states is the development of various groups as clients; that is, we are attempting to determine the needs of educators, broadcasters, researchers, artists and librarians and consider how we might respond to them. This is partly in response to these different sectors who view TVO Telidon activity outside of the context of the field trial activity.

11.2 Survey of Achievements

Concerning promotion, achievements have been made in the following areas:

Conferences

Over the past year TVO has presented papers and demonstrated Telidon at the following major conferences:

- American Association for the Advancement of Science, Toronto

- Western Canada Library Association, Jasper

- North American Association of Summer Sessions, Montreal

- AMTEC Annual Meetin, Truro

- U.S. Department of Education Conference on Technologies, Washington, D.C.

- ECOO Conference, Toronto

- Canadian Association for University Continuing Education Annual Meeting, Montreal

- Canadian Book Publishers' Council Professional Development Seminar, Toronto

- Videotex '81, Toronto

Media

Besides publication of the articles referred to in section 11.12, TVO has contributed to countless interviews for magazines, newspaper articles, radio and television interviews. We have even made our office available for film crews to shoot footage on Telidon.

Marketing

As a result of giving presentations to various groups we
began to get feedback as to what is needed in the educational
environment. For example, questions concerning the cost of
host operating software led to the idea that developers of that
software ought to consider an "educational price" (ie. reduced
price) for the software. Software costing $200,000 is beyond
the range of most educational institutions but if they could
receive it at a substantially lower rate (say $50,000) then
an educational consortium might afford such a purchase.
The effect would be easier availability and possibly more
locations running Telidon-based software.

Again, based on feedback from the educational community, we have
been able to advise manufacturers on the type of product that
would be of interest to this sector.

As mentioned in section 11.12 we have received many requests
for our content. In addition to the "bartering" of pages,
we have helped Rogers Cablevision in Toronto initiate their
Telidon activity by creating graphics to introduce the TVO 2
channel and the Galaxie service carried on the channel.

Balance of expectations and reality

Increasingly during the last year, through presentations,
papers, questions and discussions, it has become obvious

that people do not have a realistic view of Telidon. That is, newspaper articles or promotional hype has led many to believe that Telidon is more developed than is actually the case. Experience has taught us how destructive unrealistic expectations can be and, so, an unexpected portion of promotional efforts have been expended in attempts to paint a realistic picture of the situation. While a seemingly simple task, the subtlety of giving accurate information without disparaging or enhancing the situation takes a lot of energy and time. In our view, it may be the most major contribution that we make to Telidon promotion.

Networks/contacts for information gathering

Having been involved in the field trial for three years, we have established a wide network of contacts among broadcasters and in the educational community. This network not only covers Canada but extends to the U.S., Europe, Australia and South America. As a means of gathering and disseminating information the network works well to keep us informed in latest developments.

Support

Ontario Federation for the Cerebral Palsied (OFCP). This group has worked with us throughout the past year, contributing to the database and evaluating the technology at one of their group homes in Toronto. We have been able to render extra support by permitting them to use the IPS on a regularized

basis to teach various of their members the skills of creating and unputting content. Television filming of OFCP Telidon activities was arranged at our offices for purposes of fund-raising for OFCP.

Others

As mentioned in section 11.12 we have loaned equipment and content to help Infomart promote their activities. Further, we created the content for CNCP to be able to test laser trans-mission of Telidon data from Queens Park to the CN Tower. Finally, at the Annual Computer show in Toronto, we made available our database to help entertain those having to wait for interviews or to see displays.

12. Systems Development Activity

In the realm of logic, it is possible to make a neat separation between operational activities and developmental activities. The reality of a field trial of new technology brings these two aspects together. Upon encountering shortcomings in the technology supplied, the field trial operator is driven to modify or to augument, so that the applications being evaluated are not distorted by an existing but remediable limitation.

The project team's involvement in developmental activities was on two fronts, -- devising modifications to existing technology, and conceptualizing new products or approaches.

12.1 Software modifications, applications

12.11 Modifications of Cableshare software

The Cableshare System's software is enormous. A few of the tasks such as the Page Scheduler and the Portal/ Database Interface are so complicated, insufficiently documented or poorly structured that they are difficult to understand and modify. An understanding of the software was achieved, however, and a number of modifications designed to assist the system operator were made, as follows.

Utility Database Dump Operating Instruction (UTDUMP)

This task produces a formatted listing of all pages in a Telidon database. It was run under the RSX-11M Operating System, when the "Cableshare Field Trial System "

was non-operational. The hashing file which is in numerical

order (i.e. block numer) is read sequentially. Each time

an "existing" entry is found, it is formatted. The database

block is then read, and selected data from the block is

formatted and appended to the current line. The program

then loops until all hashing entries are processed.

The project team preferred to dump the Telidon database

partly or in whole, either in numerical order (i.e. page

number) or by the date of page creation, as the Utility

Database Dump proved inappropriate for database management

purposes. Thus alternative sort was deemed necessary.

Following is a detailed summary of the software modification

Utility Database Dump.

(i)   Sorted Database Dump (SUTDMP)

This task is to sort the Telidon database in numerical

order (i.e. page number) or by the date of page creation.

Then the output file is stored in ascending order and

printed on the DECwriter.

First, the formatted listings of all pages in the Telidon

database are stored into a multi-array. Secon, the key array

for Page or Date and Time is set up. A sub-routine "SORTDB"

is invoked and the key value is sorted in an ascending

order, by using BUBBLE sort mechanism.

(ii) <u>Wildcard Database Dump (WILDMP)</u>

This task is the modification of sorted Database Dump (SUTDMP).
The sorted Telidon database can be outputted partly or in
whole by using a wildcard "*", same operation in RSX-11M.
For example: A) <u>Sort by Page number (xxxx.yy)</u>
Telidon page number is broken into two fields, separated by
a ".". The first 5-digits are page number followed by a
2-digit document number.

*   stands for all pages in the Telidon database

*1   stands for all pages ending with 1

18*   stands for all pages starting with 18

18*.5   stands for all pages starting with 18 and having at
         least 5 document pages

B) <u>Sort by DATE of page creation (DDMMYY)</u>

3 fields are named DD-Date, MM-Month, YY-Year

sp(space) all pages that are created on the most recent date

*   stands for all pages in the Telidon database

*01   all pages that are created in January of the most
         recent year

**82   all pages that are created in 1982

15   all pages that are created on 15th of the most
         recent month & year

1510   all pages that are created on 15th October of most
         recent year

150282   all pages that are created on 15th February, 1982

By calling subroutines "STPAGE", "STDATE" and "SEARCH", the input string is standardized and the matched pages are outputted on the DECwriter.

Finally, the development of these subroutines proved useful to the broadcast programmer, in terms of "tracking" the database content more efficiently (eg. at a glance, the project management could identify new units for the cycle, knowing the amount of bytes per page - thus the size per cycle could be easily balanced, it also lent itself to the identification of material created at different time periods - helpful in the updating process). Although not available on the TES software, these routines would be useful additions, as they have proved their worth.

12.12   Changes in headering

The Telidon staff created a TECO macro (12.121) and modified the CRC Header-Editor software (12.122) in order to automate the header-editing process as much as possible. The primary effect of the TVO modification was to transform headering into a batch-processing operation.

12.121   TECO macro (BATCH,TEC)

It automatically creates a batch file that contains the update mode, the file name, and page number. The files are formatted so that they can be headered by batch processing.

12.122   The Modification of the CRC Header-Editor Software

To set up the default for the account numbers, the ID information, the database number, the storage divice for DOC, VISTA, and other database. In order that:

A)   the system be simple to operate

B)   to automate as much as possible given that the data files must be headered in order to be externally loaded.

12.13   IPS to IPS Communications Software Modification

Using software from the Department of Communications and Norpak Ltd., the Telidon project achieved IPS to IPS communication with a Californian Telidon trial. It was necessary to configure the IPS to handle the IPS to IPS (which was not initially possible). The software was also modified into a batch process which permitted more than one file to be sent at a time.

TVOntario provided assistance to Infomart and others in the industry to establish working IPS to host communications. There was some exchange of content with WETA, in Washington using this method.

Notwithstanding our successes in using this software, analysis revealed many problems. One problem especially was that transfer of material from one IPS to another reuired staff support at both end of operation. The entire operation might take at least two or three hours. Therefore, although the

concept is necessary and most valuable, many projects are investigating similar but more sophisticated products like the GABA software from California (see section 12.2).

12.2 ASCII Interface

The above term refers to the means of recording information over communication lines from a remote computer as a step in the machine-readable conversion of ASCII - coded information to Telidon display.

The concept was initially implemented on an APPLE II micro-computer. While this provided needed experience in the processes that accompany such an operation, certain failures in the areas of reliability, simplicity, and flexibility indicated that improvement was needed. Accordingly, the project team brought together hardware and software components that better address the need for an efficient means to process information from remote sources.

12.21 The Winchester Configuration

Hardware for the improved interface is centered on an LSI 11/23 micro computer. The 11/23 is housed in a VT100 video terminal. The operating system is RT-11 version 4 and, along with other programs and data, is resident on disk. This disk unit is comprised of a high capacity fixed disk using Winchester technology and a floppy diskette drive.

The fixed disk emulates three RL02 disk drives for a total of 60,000 blocks. This is equivalent to 60 double density diskettes, 30 million characters or 30,000 Telidon pages.

The communications interface provided with this system allows it to be connected to other computers and peripherals using a variety of formats. The speed of operation of the LSI 11/23 is comparable to some mini computers and its memory management capability allows it to run such systems as UNIX and RSX-11M. The VT103 keyboard and controls are quite user-friendly and reliable. The access speeds associated with a hard disk make the system more powerful, more productive and easier to use. The massive storage and three unit configuration of this disk drive make it capable of handling much information.

TSX-NET Software

Among its other uses this machine runs software called TSX-NET developed by Glenn A. Barber & Associates in California and which provides the ASCII Interface Capability. One of the programs included with this software allows the LSI 11/23 to operate in a virtual terminal mode. This allows the computer to appear to the user as a terminal connected to the remote computer. The user may however issue commands to the program which instructs it to store all incoming text (or any ASCII) in a file which can be edited later.

12.22 Development of Information Retrieval Variations

In applying the interface concept to specific cases, there has been a need to examine in detail the file formats that a host uses in structuring its information before an attempt is made to retrieve information. Variations in technique are illustrated in the following.

A) ## Accessing a Preformatted Information Source

York University chose to modify the structure of their content before it was accessed by the Telidon project. Using DEC computer software "RUNOFF", they reformatted the textual information so that the length and number of lines on a page would reflect Telidon page limitations. Then, they added text formatting codes to their textual information. Thus, when the Telidon project accessed the York University data, it was possible to convert it into Telidon pages without further editorial revision. This effort represents a cooperative venture that can be used as a model for future information sharing within a network approach.

B) ## Accessing a Non-formatted Information Source

The Telidon project usually access files which are formatted in terminal format but we have also had limited experience in accessing data housed in record format.

As we descovered when we attempted to retrieve information housed in the Museum of Science and Technology's VAX 11/780,

it is extremely difficult to retrieve large and cumbersome
record I/O (index sequential format). The size of the file
was 1000 blocks. The phone links with the VAX 11/780 (at a
slow 300 baud rate) could not support the downloading of
information since this process would have taken more than
five hours. Since the GABA software housed in the LSI 11/23
permitted us to manipulate and alter the desired text source
file, the programmer decided to truncate the unnecessary
data and remove the "trailing" blanks. Then, the format of
the file was changed from record format to a more manageable
terminal format. Only then was the file down-loaded from
the VAX 11/780 in Ottawa to the Telidon project's Winchester
Configuration. It was still necessary to follow the normal
procedures (some editing, insertion of text formatting codes)
before data could be converted into Telidon pages. For examples
of information that are being collected in this way, see
section 8.4: Information Interfaces.

Information is most efficiently processed into the required
form right on the LSI 11/23. One program, the Norpak Text
Composer, given commands included with the text, will process
files into TELIDON pages. Other programs which have been
developed in BASIC, TECO, and FORTRAN etc., are used to change
the format of the text files or automatically include the
commands required by the Text Composer.

12.3 Special Projects

During the course of the field trial there has been
opportunity to experiment with small enhancements to the
various system components. The systems as provided typically
provide a minimum level service. Improvements to the system
can be as simple as rewriting an incomprehensible user manual
or as complex as modifying existant software and hardware.
The key point is, the Telidon system is just another computer
network. Each user will have their own peculiar needs and
goals for its use. The ease with which a Telidon system
package can be modified will be important to assuring the
delivery of a high quality service.

12.31 Down Line Load

For some time it has been a thought that the Broadcast
Telidon service should not be seen as a creature unique
from other methods of data communication. To demonstrate
that teletext service could be used to do more than
provide a topical daily educational magazine throughout Ontario,
an effort was made to provide the hardware necessary to
capture and store pages from the teletext cycle that
would be operatable in the various field sites. The
capacity to down load information changes the nature of
program content that one might consider for a teletext
service and addresses some of the cost and quality problems
that rural areas experience with phone line based services.

The configuration developed uses a Mk 3 dual decoder.
The serial port that connects the teletext board to the
videotex board is jumpered to create a second RS-232
connection mounted on the rear of the decoder. Request for
pages can be sent directly to the teletext board through
this connection. As the decoder PDIs are sent to the
videotex board they are also passing through this
connection. The current implementation of the system
uses a modified Mk 3 to receive and decode the teletext
information and an EPS-1 to capture, store and re-display
the information. It would not be difficult to develop a
system for a microcomputer that would allow for storage on
a floppy disk. The power of the microcomputer would allow
the possibility of recognizing the Telidon tree structure
and more sophisticated filing system.

12.32   Locking Shift Key for IPS

One user of the IPS unit during our field trial has suffered
from cerebral palsey. Scott's disability was such that the
method of manipulating the IPS keyboard was a mouth held
stylus. It was not possible for him to use any of the
"shift" function commands available on the keyboard.

The FAST button on the IPS keyboard is a shift key with
another name. Cybernex, the manufacturer of the keyboard
was contacted and they provided the circuit diagrams

and locking key switches. The Fast Key position of three
keyboards was fitted with a locking key switch during
December 1981. This now permits Scott to have Fast control
of the cursor in addition to accessing the grey colour values
and ASCII special characters.

12.33   Local Communications Network

Another capability of the TSX-NET software mentioned before is
the remote control of other computers running in the RT-11
operating system. This allows the VT103 to access directly the
disks and communications of another computer as well as
controlling its actions. One use for this ability would be the
actual insertion of Telidon pages onto the VBI. Although the TES
configuration must be in the broadcast control centre, the rest of
the computer equipment may be elsewhere (refer to the diagram
in section 8,1).

12.34   Broadcast Cycle recording at 3.9 megabits

During the early stages of the field trial it was learned that
recording made a Sony 3/4" VCR of the video o/p from master control
contained adequate levels of the teletext signal to allow the decoder
to recover the information. The ability to use a 3/4" VCR as a mass
storage device for VBI information provided convenient back-up for
demonstrations and permitted the development of a field test
procedure for installing teletext decoders. The 4.6 megabit data
signal cannot be recorded on the VCR so that this facility
is no longer applicable.

12.35   Video Overlay

Early work with the IPS.0 pointed out the need for a convenient

method of tracing real objects as a method of page creation. A

simple video mixer circuit was added to the IPS that allows

a black and white TV camera to overlay the drawing window of

the IPS colour monitor. Moving the cursor along the outline of

the object displayed on the screen provided the tracing function.

With the advent of the graphics tablet, this approach was superceded.

12.36   TECO MACROS for News Feed, Editing and Text Composing

Transforming a large text file containing unedited news stories,

control characters and blank lines into an edited file which has

the necessary text composer formatting codes, can be a time-consuming

process. A recently developed TECO macro pre-packages the standard

format codes so that the editor simply has to request a file to edit

and then choose the appropriate background title, files and format

pages; the rest of the formatting is done automatically after

the editor picks the stories he/she wants to run. The production

time needed for news editing has decreased by 30% because of this

software routine.

13. <u>Study of Broadcast Transmission</u>

Over the life of the field trial, TVOntario has offered its network as a test bed for the study of the transmission characteristics of Telidon at different bit rates and utilizing a variety of carriage modes, -- UHF/VHF off-air, relay, microwave, satellite, MATV, cable. We have also taken the position that the study of transmission performance was and is vital to the design and marketing of broadcast Telidon, and that we were willing to assist the Department of Communications in the collection of data in the field under variable conditions if supplied with appropriate instrumentation for bit error rate testing related to different transmission rates.

In the absence of such instrumentation, our monitoring of transmission characteristics has been informal, albeit comprehensive. We have had ample opportunity to confirm the British experience, which identified the narrower tolerance manifested by teletext as compared with television. A television signal can penetrate successive transport over the airwaves, cable, and MATV, and even with a measure of multipath obfuscation, present a decipherable image to the user. In the same circumstances, broadcast videotex stands a much smaller chance of arriving on target in readable shape.

Given the great variability of reception circumstance, it
has not been possible to draw conclusions in detail about the
conditions which predispose to poor display of Telidon.
Obviously, the better the television signal, the better the
prospect for error-free Telidon display. Satellite trans-
mission has proved to be as error-free as any, given
accurate "tuning" of the dish antenna. The variability of
tuners within different makes of television receivers is
obviously a problem, and it would appear to this writer that
Norpak's decision to incorporate a multiple-mode tuner within
its broadcast terminal is a practical measure for addressing
this problem.

Cable transmission appears to be largely unknown country,
and demands a great deal of attention. The experience of
the Telidon trial conducted by TVO is that some users obtain
very good display, and others very poor display, and it is
not clear precisely what factors in the cable "chain" may
be at fault in specific cases.

We feel obliged to point out the high level of irritation
induced in the user by the error detection/correction
feature of the broadcast decoder. Granted the theoretical
proposition that a garbled display is unwelcome, there is

however an argument to be made in favour of letting the user decide what level of acceptability of display is to be tolerated, rather than impose irritating delays. Assuming a bit rate of 4.6 mbs and a cycle of over 100 pages, maximum wait time for any page could be 20 seconds. If error detection stops display very infrequently, annoyance is minimal, but if transmission problems make even minor errors more frequent, the user is driven to exasperation waiting for page after page to appear on the screen.

Other than (1) sensitivity to quality of broadcast signal and (2) nuisance value of error detection, the principal problem encountered was audio crackle or buzz. Obviously from the explorations of this phenomenon carried out by TVO and DOC personnel to date, this is not a single problem responsive to simple solution. While it has manifested itself at 4.6 mbs much more than at 3.9, there is an implication that the same or other perturbations could be induced by transmission at 5.7 mbs, and it is recommended that intensive study be undertaken. For more on the topic, see below, item 13.2.

13.1   Transmission Rates

TVOntario has operated 3 different broadcast encoder
systems and transmitted at 3.9 megabits and 4.6 megabits.
The first encoder system was the CRC inserter, which operated
at 3.9 megabits. This device provided reliable trouble free
service. The next encoder was the Cableshare system which
also operates at 3.9 megabits. The data output of the Mok
inserter was not as stable as one would like. The output and
bias levels would drift causing the data signal to interfere
with other parts of the broadcast signal. The thorough
documentation provided by Cableshare allowed TVOntario staff
to correct the problem promptly. Observation showed that
the 3.9 megabit signal propagates through the transmission
network without difficulty. Reception difficulties were
usually the result of poor CATV, MATV systems, or multipath.

Starting in December 1981 the TES was used to provide a 4.6
megabit rate service. In combination with the Mk 3 decoders
the performance was very impressive. A 120 page cycle is about
16 seconds long. In most locations the signal quality allows
the decoder to capture the entire page on the first cycle
pass. In these conditions the teletext service compares
favourably with response times on the Ottawa host during
peak hours.

As the reader may be aware, TVOntario offered to assist DOC
in the conduct of comparative bit rate studies (4.6 and 5.7)

during the year but encountered a problem in the supply
of appropriate instrumentation. At this writing,
preparations are in process to test at 5.7 megabit rate.

The current standard of teletext data rate proposed by DOC
is 5.72 MB/sec and will be the rate for broadcast services
available in the future. Accordingly, tests are required to
determine the probability of error-free reception of teletext
data. TVO, having interest in these data, has suggested to
the DOC that some of these tests be performed on the TVO
network. These tests, done with the assistance of CRC
equipment, are scheduled for early April.

To perform these tests it is planned to insert a random code
into Line 15 of the TVO signal and then to measure parameters
at existing decoder locations. These parameters will be field
strength, eyeheight and bit error rate. It is anticipated that
the field tests will take approximately two weeks with about
four sites chosen from the five districts visited. Thus, data
from a total of twenty sites will be available, and should
be a sufficient number for some conclusions to be reached
regarding the propagation properties of teletext and the
capabilities of the TVO network. During this time of testing
the regular field trial teletext will be unaffected in that
information will be broadcast over lines 16, 18 and 20 at the
current 4.6 MB/sec rate.

After tests are complete a report will be made available
summarizing the results of the data.

13.2 Observations of Transmission Problems

As indicated elsewhere (8.2), observations on transmission
characteristics have been comprehensive and informal rather
than systematic and scientific. Reference has already been
made to the interrelationship of television signal quality and
Telidon display characteristics. Following is an interim report
on the problem that emerged in highest profiel during the last 4
months of the field trial year.

Teletext 'Buzz' Syndrome

Shortly after TVOntario converted its teletext data rate from 3.9
megabits to 4.6 megabits, in December 1981, a sharp increase was
noted in the number of viewer complaints received, relating to
noise on the TVO sound signal, and in particular, to an annoying
buzz sound which was continuously present.

From data provided by the viewers who called in, who undoubtedly
represented a small percentage of the total number experiencing the
buzz syndrome, it was apparent that the problem was neither peculiar
to any one form of signal reception, i.e. cable, direct or MATV,
or to any particular make or age of receiver. However, it did
appear to be receiver dependent, to the extent that not all receivers
of a particular make and model exhibited the effect.

It was suspected, at first, that the buzz might be directly related
to the close proximity of the 4.6 megabit data rate to the 4.5 MHz
sound IF frequency employed in inter-carrier receivers.

Accordingly, some tests were conducted at TVOntario in January 1982, whereby the teletext data rate was changed, successively, from 3.9 to 4.6, to 5.7 megabits while monitoring the 'buzz' level on a number of inter-carrier receivers. The conclusion of this test was that the buzz was, in fact, present at all data rates, although the effect was most pronounced at 4.6 megabits, with the level at 5.7 being slightly lower and the level at 3.9 being barely detectable.

During the course of the tests described above, it was noted that the inserted level of the teletext data signal was, in fact, 80 IRE units rather than the stipulated level of 70 units. It was also noted that the off-air monitoring signal for the TVO Ch 19 transmission, as received in Master Control via a 'house' MATV system, exhibited substantial overshoots on the teletext data, which increased the effective peak data pulse amplitude to levels up to 120 IRE units. On checking with the CN Tower, it was found that the output of the TVO transmitter was exhibiting about 10 IRE units of overshoot at its output, for a total amplitude of 90 units. Since one possible mechanism for the generation of the buzz effect would be a condition where the amplitude of the teletext data pulses, plus overshoot, was sufficient to over-modulate the visual transmitter and, in effect, momentarily interrupt the visual carrier, and thus the sound carrier in inter-carrier receivers; it was decided to reduce the data insertion level at Master Control and note the effect. The level was reduced to 60 IRE units, by means of an external attenuator and to our considerable, albeit temporary satisfaction, the buzz disappeared from the local test receivers.

For a time thereafter, full-time teletext transmission was resumed, until it became apparent that a substantial number of viewer complaints of 'sound buzz' were still being received. This indicated either that certain receivers had a much greater sensitivity to pulse overshoots than those employed in the TVO tests or that a second mechanism was at play. This led us to examine the recent work which had been done at WETA, Washington, D.C., where a specific problem of very high incidental phase modulation (ICPM) of their visual transmitter had been isolated and corrected. This work, which was partially initiated by the findings of the TVO tests, resulted in virtual elimination of sound buzz complaints from WETA viewers.

It should be explained, at this point, that ICPM is not a characteristic of visual transmitters which is normally measured on a routine basis, since it does not appear to affect the video performance. It can, however, produce sound buzz effects on inter-carrier receivers, due to the detection of the phase modulation components in the FM sound detector.

It would be gratifying to be able to report that our analysis and correction of visual ICPM in the Ch 19 main transmitter had corrected the problem. Unfortunately, our efforts to optimize the ICPM performance of the transmitter have been hampered by a series of component failures, which have necessitated operation at reduced power and sub-optimum performance. It is now expected that the transmitter can be restored to normal operating performance, and our analysis completed by the end of March '82.

13.3 Inferences

13.31 Further study of the characteristics of Telidon transmission is of critical importance to the successful evolution and marketing of broadcast Telidon systems.

13.32 It may be obvious to say it, but the search for correctives to such nagging problems as unacceptable display and audio crackle must be conducted along the entire continuum from signal source to user site. Study must range from the innate characteristics of broadcast data transmission to the impact of variables in the transmission chain.

13.33 Research and development in this area requires a crash program.