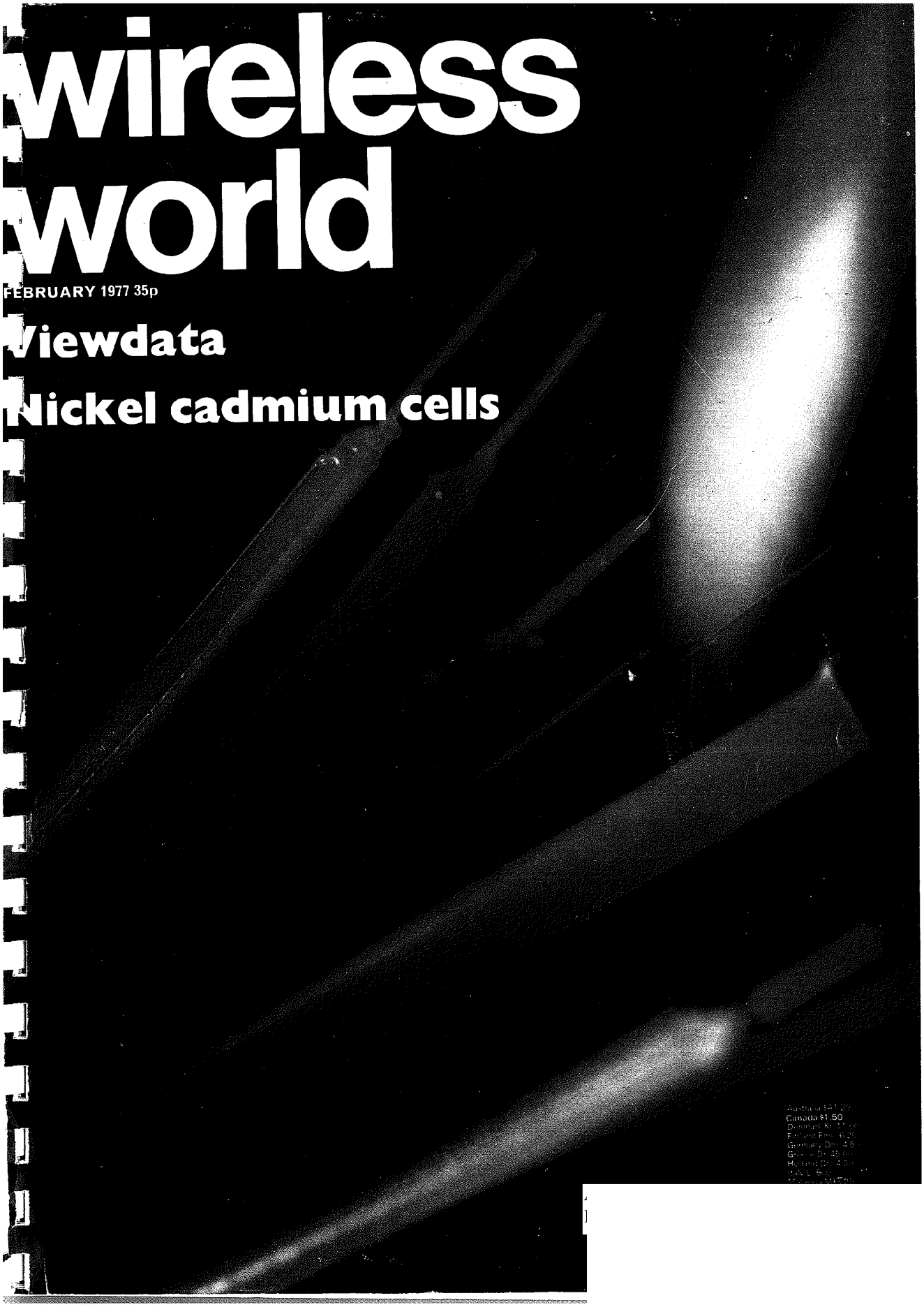
wireless world

FEBRUARY 1977 35p

Viewdata

Nickel cadmium cells



wireless world

Electronics, Television, Radio, Audio

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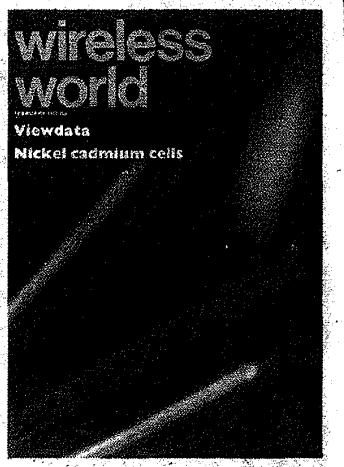


Front cover shows a group of silica optical fibres made by Standard Telecommunication Laboratories for use in optical communication systems. *Photographer Paul Brierley*

IN OUR NEXT ISSUE

Electronic rhythm accompaniment. Constructional design for a "rhythm section" which controls the musical timing of sources giving percussion sounds and can be used with an electronic organ.

Interference from amateur stations with television, sound and audio equipment — how bad is it? Results of a RSGB survey that attempts to assess the situation fairly.

Television test generator. Construction of a laboratory instrument giving cross-hatch, dot matrix, colour bar and grey scale patterns. Simple design based on t.t.l. integrated circuits.

VIEWDATA

The Post Office's textual information and communications system: 1 — background and introduction

by S. Fedida, B.Sc.(Eng.), M.Sc., F.I.E.E., A.C.G.I. *Post Office Research Centre*

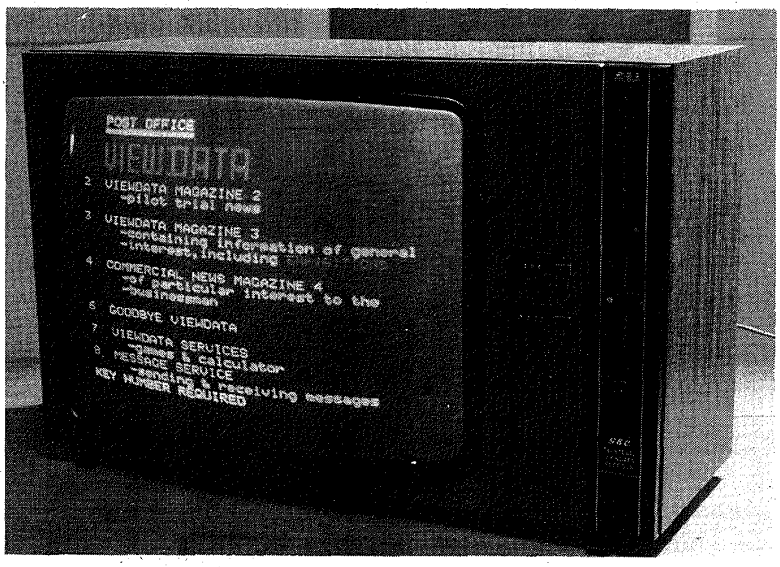
Viewdata is a system for disseminating and retrieving computer based information, using the domestic telephone line for communication and the domestic television set for display. It differs from teletext which is a specific system of broadcasting textual information interleaved with pictorial information: the two systems are complementary rather than competitive. This article looks at earlier systems of accessing computer data banks from remote points using telephone lines and then introduces the Viewdata system now on pilot trial in the UK.

Essentially the concept of accessing a computer data bank from a remote point using telephone lines is not new. The technique was demonstrated in the mid-60s by Dr Sutherland of the Massachusetts Institute of Technology, and has been used increasingly ever since, but mainly by the professional computer user. Indeed networks of computers have been installed in various parts of the world for this purpose and for the purpose of computation. In the US an ambitious computer network ARPANET has been in operation for some years and has been extended to provide world wide coverage. In Europe a new system EURONET[1] is in process of being implemented to provide a computer network for scientific and technical information in the European Community.

Many private computer networks have also been installed world wide to provide business and scientific computer facilities on in-house bases. Viewdata on the other hand belongs to a family of computer-based information systems which are intended for the general public, i.e. users who have no computer training whatever and indeed who do not intend to undergo such training.

Systems of these kinds have to be specifically tailored to this class of users who may well have, and indeed will have, considerable expertise and intellectual ability but not necessarily in the intricacies and minutiae of computer programming. In general they are anxious to use the capabilities of computers both for the purpose of information retrieval and other purposes, but have neither time nor indeed the inclination to submit to the usually tiresome computer protocol. (The protocol is the set of rules and instructions which govern access to computers and the use of their programmes.)

Several attempts have been made in the recent past to bring computer-based information to the people.



Viewdata index displayed on a commercial teletext/Viewdata receiver.

The Reston experiment. A well documented attempt is the Reston experiment[2] in Virginia USA, using the Mitre Corporation interactive television system TICCIT which stands for "time-shared, interactive, computer-controlled information television" utilising a standard television receiver as a display.

Essentially the system requires that the user be connected to a cable television network, over which are transmitted a number of still tv frames, 60 different frames per second. Thus assuming an information cycle time of 10 seconds, i.e. each user accesses a different frame every 10 seconds, the system can support 600 users simultaneously on a dedicated tv channel, each user receiving his own selection of information.

Associated with the user television receiver is a video tape recorder, which takes a recording of the frame intended for the user and plays it back to the tv at the rate of 60 times a second.

The individual selection of information frames is carried out using a telephone connection from the user to the computer centre, together with the push-button set on the telephone with which the user may key the number of the frame required. When this is done the computer transmits this frame followed by a user address, which is

coded on line 480 or 481 (for even and odd frames) of the tv scan. A coupler/decoder at the user end examines this address and connects the video recorder to cable for the duration of the following frame, thus capturing the frame selected.

The home equipment needed in this system is not only a tv set but also a video tape recorder and a special adapter, while the communications medium consists of a wideband cable and a telephone connection.

In-Touch. This computer information service[3] was launched in Seattle, Washington in 1973 with the backing of the Seattle First National Bank for the purpose of providing a number of financial and budgeting service to the home user and the small business. It uses the push-button telephone, to send instructions to the computer, which then provides a voice response. Thus the terminal equipment is minimal. The main problem of course is to so organise the service that the obvious limitations of the terminal equipment both in transmitting and receiving information are effectively overcome. The other problem noted by the originators of the scheme, and somewhat related to the above but clearly much more complex, is to so arrange the dialogue between computer and user that the latter needs no special computer training whatever. It is believed that this system closed down after an intial one-year experimental period.

DIALS (calculation by telephone). This system[4] was developed by NTT (Nippon Telegraph and Telephone Co.), the public telephone administration in Japan, to provide a calculation service to telephone subscribers, on an on-line, real-time basis. The public service was initiated in 1970/71. In this case also the push-button telephone is used as a transmit and receive terminal, outgoing instructions being keyed on the push-button keypad and transmitted to the computer as a sequence of audio tones. The computer response is a voice signal which gives the result of the computation.

The calculation facilities offered by DIALS are fairly complex. They include the simple arithmetic operations +, −, ×, ÷, $\sqrt[2]{}$ and also basic facilities such as trigonometric functions, logarithms and so forth. It is also possible to input an algebraic expression with dummy arguments which is memorised by the computer. This is then followed by sets of arguments supplied by the user on which the computer operates. Finally it is possible to call some library programmes, for example for statistical work, compound interest and the like.

Clearly the standard 12-button telephone keyboards cannot be used without substantial modifications to transmit the required instructions. This is

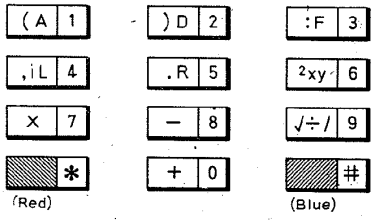


Fig. 1. Overlay template attached to push-button telephone used in DIALS calculation service

overcome by superimposing a removable template on to the dial and using groups of numbers and symbols for each of the required calculation symbols. A diagram of the overlay is shown in Fig. 1. For example, an expression such as

"4×(3+5)−6.2"

is transmitted as

4*7*13*05*2*86*52**=

The end group of symbols **= signifies the "go" instruction (instructing the computer to go ahead with the computation).

Trigonometric and logarithmic functions are transmitted as a number preceded by F and followed by the argument in brackets, e.g. $\log_{10}(X)$ is transmitted as F2(X), while library programmes are given a number preceded by L, e.g. the integrating function is L36.

The use of the template has been explained at some length to indicate the complexity introduced in a system of this kind, if one is limited to using just the 12 buttons of the telephone push-button set. This complication is avoided in Viewdata in a number of ways to be described later.

The use of a voice response system for imparting the kind of information mentioned above is obviously fraught with pitfalls, and the complexity of the coding needed to pass instructions no doubt added to the difficulties.

Bell Picturephone computer access system. As part of the development of Picturephone in the USA, means were developed to display computer generated information on the Picturephone station set.[5]. Picturephone is a Bell Telephone development which provides face to face communication between telephone subscribers – a two way video telephone. Special lines (video access lines) must be installed to transmit Picturephone information to the subscribers. These consist of two pairs of lines equalized to transmit satisfactorily, at least in the initial stages, a bit rate of 6.312 Mbit per second. In addition the normal telephone connection is also required. A typical local arrangement is shown in Fig. 2.

Given an environment which has already been designed and established to support Picturephone, it is clearly possible to enhance the video facility by providing the option of displaying computer-based information as an alternative to the normal pictorial information. To do this a display data set (equivalent to a modem in UK terminology) was developed to provide computer access to Picturephone users. Essentially this data set, which is sited at the exchange, acts as an interface between the computer and the Picturephone station at the user's premises.

Instructions to the computer are sent by the customer to the exchange using the push-button telephone (m.f. signalling) as in the previous systems. This is converted by the display data set to ASCII* characters and transmitted to the computer along a narrow-band data line, which could be a standard voice circuit. The computer response, which is a string of ASCII characters, is received by the display data set and stored therein. It is converted in the data set to a video signal which is then transmitted to the Picturephone station as if it were a standard Picturephone signal. Since there is no storage at the subscriber's end this information needs to be sent repeatedly, television fashion, to keep the display refreshed, at 30 times per second.

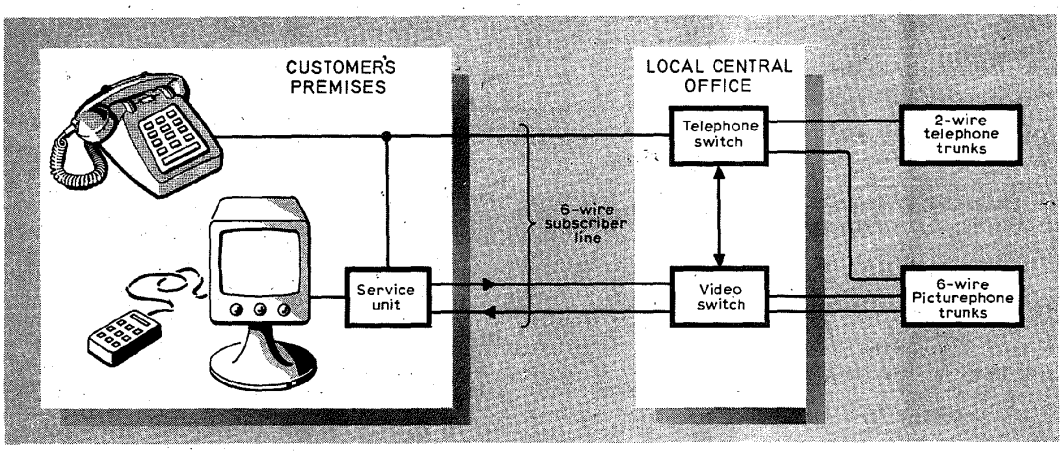
Clearly this technical solution to the retrieval and display of computer based information is satisfactory in an environment where the Picturephone is already established as a viable communication service, and its development might then have followed the lines of Viewdata in terms of protocol, extra facilities etc., had it been persevered with.

Viewed however, as a means of providing simply a new information and communications service to the general public, its association with Picturephone delayed and indeed hindered its proper development and timely introduction, since it depended on the establishment of a wideband Picturephone capability across the country to achieve the penetration needed to make the service economically viable and truly available to the general public.

Development of Viewdata

The Viewdata concept began in the Post Office Research Department in 1970/71, more or less concurrently with the systems mentioned earlier. As with these systems there was the notion that there was an important potential for applying computer-based information systems to the public service area, but that, while technologically there were no insuperable hurdles to overcome, nevertheless there were fundamental problems that had to be resolved before practical and economically viable systems could be designed and engineered to be usable by the general public.

* American Standard Code for Information Interchange.



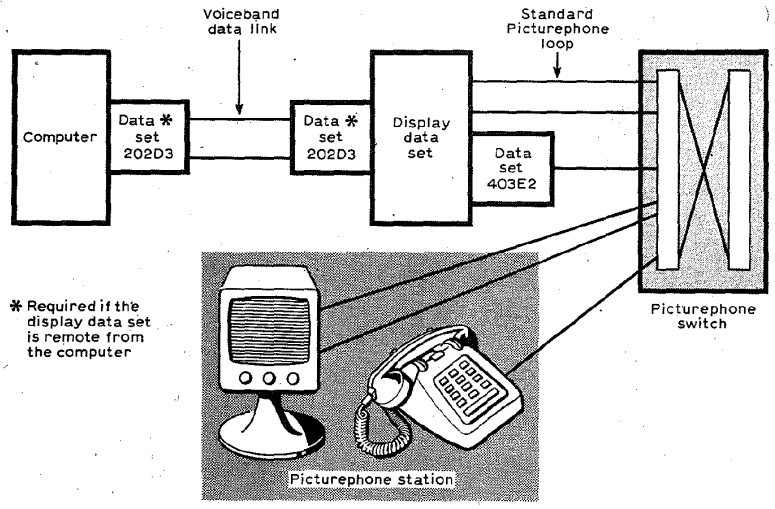


Fig. 2. (above). Basic local arrangement used in the Picturephone system developed by Bell Telephone; (right) Picturephone computer access system

In common with all these systems, Viewdata set out to solve these problems. As was to be expected, each solution turned out to be somewhat different, partly to adapt to a different environment, but also because of different design philosophies. These problems are in the following areas:

- the terminal
- the transmission system
- the computer relationship
- the system potential

The terminal. The terminal used to communicate with the computer clearly has to be a low-priced, attractively styled and reliable piece of electronics to ensure a wide market penetration with the general public.

The push-button telephone is clearly such a terminal. Indeed in the standardisation of m.f. telephone systems, this possibility has been kept firmly in view, and has resulted in proposals for enhanced push-button sets containing 16 keys.

While the push-button telephone is a suitable transmission terminal, for many users it has obvious limitations for the more advanced applications. Indeed attempts at squeezing a large alphabet from the limited number of keys only leads to confusion and irritation on the part of the user. As a receiving terminal it requires that the computer response be a voice response. Here also this could well be acceptable some time, but it suffers from very serious limitations. Where the amount of information is fairly limited, e.g. one or two items of information, voice response is probably acceptable to many users. Even then, the fleeting nature of the voice response hinders comprehension very seriously and messages need to be repeated several times to allow full understanding, the taking of notes etc.

Two of the systems described above used the pushbutton telephone, but the extent and versatility of the service planned for Viewdata made the push-button telephone associated with voice response quite unsuitable for a good general purpose information system capable of growing to meet the needs of the users.

The alternative to a voice response system is the visual display. This is easier to implement and vastly cheaper as far as the computer is concerned and to the user it offers unparalleled scope in comprehension and in the range of information that can be put over. It can lend itself to multilingual and graphical information fairly readily. One of the important aspects of Viewdata is the possibility of implementing a wide range of information services across multi-national boundaries.

Visual displays have been in widespread use in the computer field for some years, but their cost is still well above that considered acceptable to the mass market. It is therefore not surprising that many information systems have sought to capitalise on the domestic television display, which, with suitable

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