

USING A DESK-TOP COMPUTER AS A MODEL DATA-BASE IN THE EVALUATION WORK OF VIEWDATA SYSTEMS

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Summary

The software package developed for the LUXOR ABC-80 type desk-top computer enables the user to write, draw, edit, store, recall, reedit, archive, etc. new and old viewdata frames. The pages can be stored on tape and on floppy discs, the latter providing quick page access of about 100 viewdata pages, the former ensuring a practically unlimited page library.

The computer, together with the software package has successfully been used for the development work of teletext experiments in Hungary and is at present serving as a model-viewdata data-base providing very cheap facilities for all kinds of engineering experiments, research and development work of viewdata systems.

Choosing the proper desk-top computer

Of the many types available the ABC-80 (Luxor, Sweden) has been chosen for the project aiming at realizing an editing terminal for both teletext and viewdata purposes.

Namely:

- The display format of the ABC-80 is exactly the same as the one used in teletext/viewdata: 24 rows, each containing 40 characters.
- The original Swedish keyboard contains practically all the accentuated characters that are used in Hungarian, so the character set was readily available for texts in Hungarian.
- The graphic or mosaic set of the ABC-80 is the very same as the teletext/viewdata systems in use and the display unit was found to be organized in a way totally compatible with the control characters used in teletext/viewdata systems.
- By using the special Basic-commands of the ABC-80 ("SET DOT", "CLEAR DOT", "DOT") it was extremely simple to implement a "drawing" mode of operation, whereby an "invisible" pen can draw lines, diagonals, etc. without knowing the mosaic codes of the different keys.

- The many efficient string handling features of the ABC-80 lend themselves for quick text-editing functions.
- The ability to record data on both tape and disc makes it possible to use the computer not only as an editing and page-generating terminal, but also as a data-base for experimental viewdata service.

Requirements of an editing terminal

In order to lay down the main strategy for a computer program, evaluation aimed at achieving good editing features; the most important demands on an editing terminal are summarized below:

- All letters, numerals and punctuation marks should be able to be typed just as easily as with a normal typewriter.
- During typing a cursor should always point to the spot, where the next character will appear. This cursor should easily and simply be movable to any position on the page without effecting the content of that page and if a character appears at the position where the cursor is moved, then this character should still remain readable. In case the cursor points to a spot where a control character is already present, then this fact should be indicated by some proper means.
- Any character in the keyboard should repeatedly be typed, if the corresponding key is pressed and held down continuously. The same rule should apply to the keys prompting the cursor to move.
- The typing of any of the 27 control characters should be possible without difficulty or annoying memorization of special rules.
- A drawing mode of operation should be provided where the same keys which control the cursor movements control the tip of an imaginary pen, that draws a line. In this way it should be possible to draw horizontal, vertical or diagonal lines in any of the 8 possible directions.
- Possibility should be provided for drawing either dot-by-dot or in a continuous fashion, and means should also be provided for erasure in the same way as drawing is made.
- A “mosaic” or “graphic” cursor should be provided on the screen while in the drawing mode of operation to show by blinking where the “tip” of the pen is staying.
- At any moment during the page make-up or editing, the possibility should be provided for sending the page
 - a) to external units (e.g. teletext coder, viewdata receiver)
 - b) to storing units cassette tape or floppy disc).

- During the whole editing procedure a full colour display of the page under making up should be visible having the same features as the black and white monitor of the ABC-80 itself.
- If the external user is a teletext coder, then odd parity should be provided for all the characters, while if the output is meant for viewdata use, then even parity should be set. Furthermore: if a control character is to be sent out, in the viewdata mode then the ESC character should automatically precede it, and providing a start and a stop bit should also be taken care of.
- Should an error develop due to any kind of operational mishandling or mistake, the page under making up should remain intact and means should be provided for recalling it after restarting the editing program.
- Should the operator wish to get the content of the page memory in hexadecimal, or decimal numbers, then this should be possible in a simple way. After listing of the page memory the return to the editing mode of operation should also be taken care of, with the current page appearing on both the black and white and colour monitors again.

Software design

Considering the above-mentioned requirements it became apparent that the keyboard functions of the computer had at least to be doubled since the number of keys is far less than needed. (The ABC-80 has no cursor-moving keys, to mention just one example.) The problem has been solved by introducing three different modes of operation:

- write mode
- cursor and control mode
- graphics mode.

In the “*write mode*” of operation all but one of the keys have their original function: lower and upper case letters, numbers, punctuation marks, etc. can be entered in the usual way. The only exception is the key “ä”, which has been reserved for the possibility to switch over to “*cursor and control mode*”. Although the CTRL (control) key together with other keys could also have been used for this purpose, it turned out that for the sake of simple and swift operation a one-key action is here essential.

By pressing key “ä” the keyboard changes over to “*cursor and control mode*”. Primarily this mode serves for controlling the cursor movements in all directions: keys “J”, “N”, “M” and “SPACE” move the cursor up, left, right, and down, key “B” results in a combined left-down cursor positioning, which proved to be especially handy, when mosaic or graphics control characters had to be entered vertically under each other.

The top horizontal row of keys have been designated for the entering of the 27 control characters used in teletext/viewdata. There are 13 keys here, but with the "shift" key this number is doubled and luckily the top right corner key ("≥") has — originally — a third function too (■), which came in handy for the 27th control character. An overlay placed above the top row of keys gives a good overview of these characters, which have been grouped logically for easy use. Although the CTRL key together with another key produced control characters as well, it was finally decided to abandon this possibility, since it turned out very cumbersome to search and find the corresponding keys in actual text-writing.

It is also the "cursor and control mode", which serves for accepting commands to send out the page for teletext coders (parallel, odd parity code), for viewdata modems (serial, even parity, 1200 Baud), for cassette-tape recorder and for floppy disc recorder, and also giving instructions for the user — all these by pressing keys: "P", "V", "Q", "Ü" and "T" resp. Naturally it is also possible to switch over to "write mode" ("I") and "graphics mode" ("G"). The key-symbols have been chosen so that they correspond — wherever possible — to the first letter of the function required, in Hungarian, so it is relatively easy to keep them in mind.

Perhaps the most interesting mode of operation is the "*graphics mode*". In this the normal cursor disappears and in turn a small "graphics cursor" begins to blink — assuming, that one of the 7 graphics (or mosaic) control characters has previously been entered in the same row, preceeding this character position. This blinking small rectangle indicates the spot where the tip of the imaginary drawing pen is to make a dot. By activating any of the cursor-moving keys — to which 4 other keys are now added to facilitate the 4 diagonal directions — this dot moves on one graphics position, leaving back its previous position either "on" or "off", depending on whether the command: "write" ("R") or "erase" ("T") was last given. It is possible to give out commands for either a dot-by-dot, or continuous operation ("E" or "F") thereby implementing both "pen" and "india rubber". All in all, the graphics mode of operation proved to be almost as powerful a tool in constructing figures of any kind as if a light-pen had been used. Finally, the key "ä" is reserved here as well for returning to the "cursor and control mode".

In order to ensure a continuous colour display of the page under editing, or to preview a page just read from tape or disc, beside the black and white display unit of the ABC-80 a separate colour monitor can be connected to the V24 output of the ABC-80. This monitor has been equipped with a Mullard/Philips type viewdata compatible teletext decoder and when connected to the V24 output, it registrates every step of the editing work being

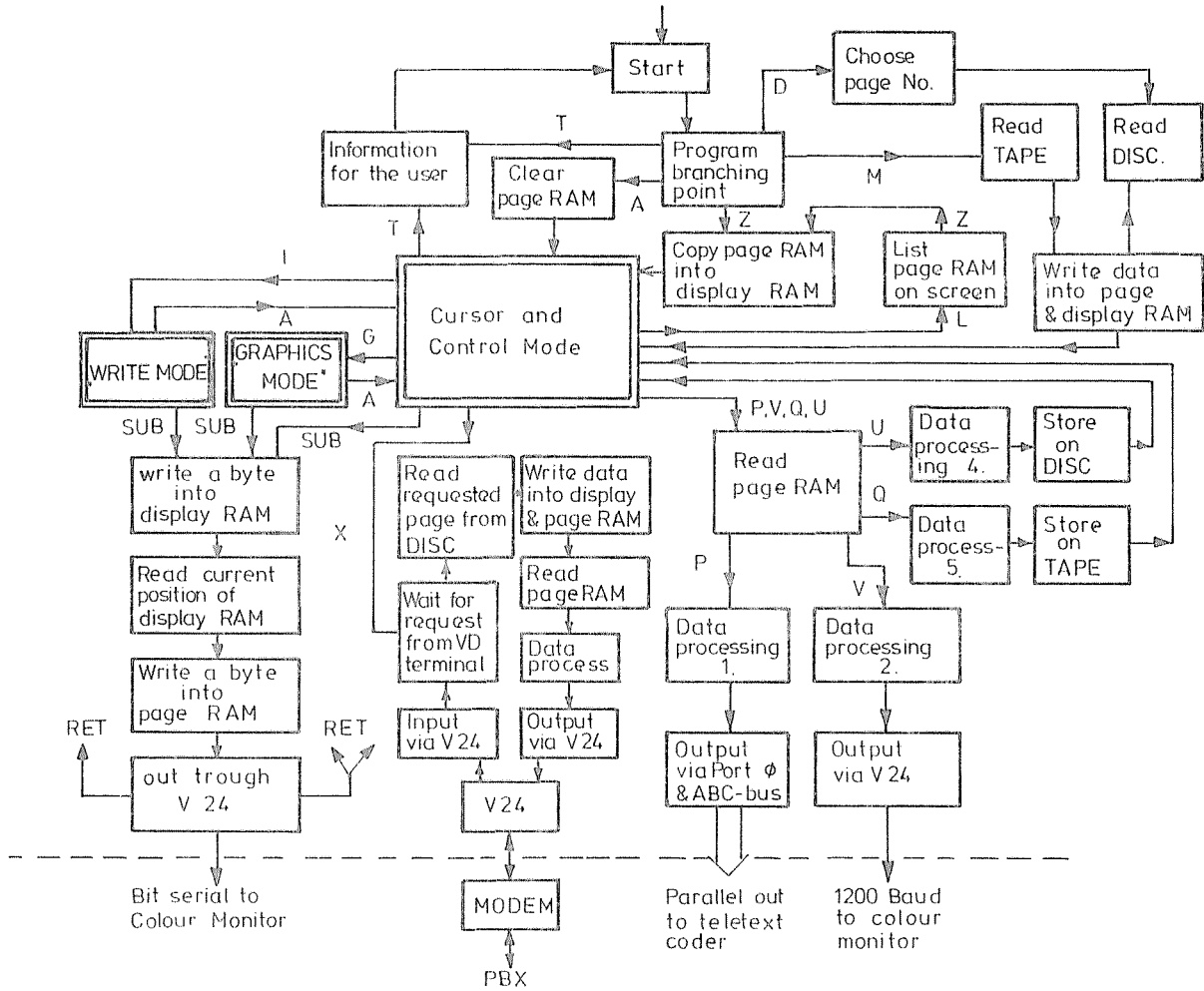


Fig. 1

done on the current page and of course the display is not only given in full colour, but also with all the other teletext/viewdata facilities, such as "flash", "conceal", "double height", "separated graphics", etc. Since the current page is always stored in a reserved 1 kbyte part of the ABC-80 RAM memory, it is also possible to check what has been sent out either in teletext or in viewdata form, because simultaneously with the data-out command the colour monitor is fed — after a form-feed — with the same data signal.

The listing of the page-memory content can be asked for at any time during the page make up work ("L"), or after a page has been called back from the archival memories. The listing is given in both ASCII and hexadecimal form and decimal units can be asked as well. Of course after the listing it is always possible to return to the editing work by recalling the RAM memory content used for page generation and editing.

The program has a separate segment, which initiates the interactive database mode. This can be called in from the "cursor and control mode" by keying in "X". Through the V24 interface a special modem is connected to the ABC-80 which can in this way communicate with an external viewdata terminal by using the normal PBX lines. Each of the two minidisc drives holds a disc full of previously written and stored viewdata pages (about 100 of them) and any of these can be asked for by the remote viewdata terminal in the usual way. If a non-existent page is called for, then the page containing the contents is sent out automatically. To return to "cursor and control mode" the interrupt CTRL-C is keyed in, after which a re-RUN starts the editing program again.

Finally, the flowchart of the complete program is given, this explains in detail how the different loops are interleaved and the design-strategy of the whole software can be followed easily.

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