VLB ARRAY MEMO No. 439

California Institute of Technology
VLBA Memorandum
MS 105-24, Pasadena, CA 91125
PHOBOS::MSE, mse%hamlet@LBL.arpa

To: VLBA Memo Series 7 March 1985
From: Martin Ewing
Subject: Graphics for Engineering and Operations

(In memoriam Jay Johovich)

In a recent computer meeting, I suggested a need for a "modern," interactive graphics-oriented control system for VLBA operations and maintenance. My general point was that technology has made much more friendly human interfaces possible than the "screen full of numbers" that is typical of the VLA. Such interfaces, if well designed, should increase operator productivity as well as making check-out and maintenance easier for the engineering staff.

In this Memo, I thought I would indicate how such display screens might be constructed. For this purpose, I have relied on the Macintosh, which is a mass-produced, 68000-based personal computer available at a cost comparable to the cost of some elaborate "dumb" terminals (~$1,500). The technology is wider than this, however. DEC supports similar hardware in its VAXstation line, and, reluctantly, the IBM PC community is adopting the "window/mouse/menu" facilities.

Basics. The basic hardware a user would have comprises (1) a high-resolution monochrome screen (512 x 342 or more pixels), (2) a cursor-moving device such as a mouse, trackball, or lightpen, and (3) a conventional keyboard.

Software supports some fundamental interface options, common to all applications programs: (1) menu display and selection of options/commands, (2) input/output windows, and (3) facilities for arranging the "desktop" interactively. Menus will be familiar to most readers, but the "pull-down" style may be new. A number of menu headers are displayed permanently across the top of the screen (say). If the user wants to examine a particular menu, she points to the header, "clicks" on it, and pulls down a complete menu (with perhaps a dozen items) under the header. By pointing at a particular item before releasing the button, she

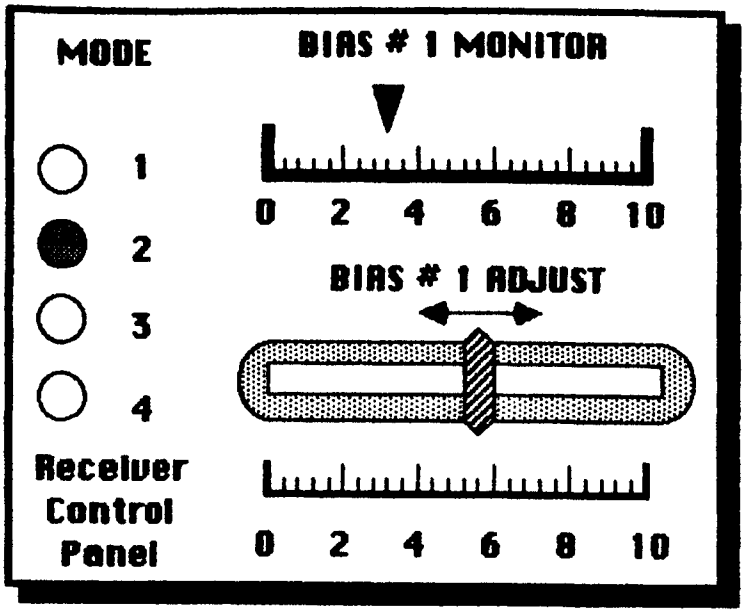
will select the corresponding option or invoke a command. (Operation is much easier than description!)

Windows. The CRT screen is accessed by programs through "windows." You look through windows onto a data area beneath. The data area may be much larger than the window, in which case "scroll bars" may be made available to the user, so that he can move the window over the data area without directly involving the application program. Alternatively, the program may set the location of the window. Multiple independent windows may be present on the screen at one time, and they may overlap. One might represent a VT100 emulation which is associated with the keyboard, while another might show a graphics screen, for example.

Desktop Metaphor. The screen can be treated as a "desktop," on which various windows are strewn like sheets of paper. Windows may overlap other windows (with appropriately hidden surfaces) so that many pieces of information are instantly available to the user (by clicking on a corner of the window) but the bulk of the screen area can be devoted to the window of greatest current interest. Other desktop objects may be represented as "icons," such as files and the "wastebasket". You can "drag" file icons to the wastebasket to get rid of them, i.e. delete them. Again, it's easier to use than describe.

Examples. The attached figure is a somewhat whimsical collection of devices and icons that could be of use to a VLBA operator or maintenance engineer. They are easy to use; they can be rearranged and selected entirely in software; and they are relatively easy to generate on inexpensive, widely available hardware.

Conclusions. There are numerous options available to enhance the working environment of the VLBA operators and maintenance personnel beyond the traditional 24 x 80 ASCII display/keyboard. The marketplace should be explored systematically before committing a large system like the VLBA to such a constrained interface.

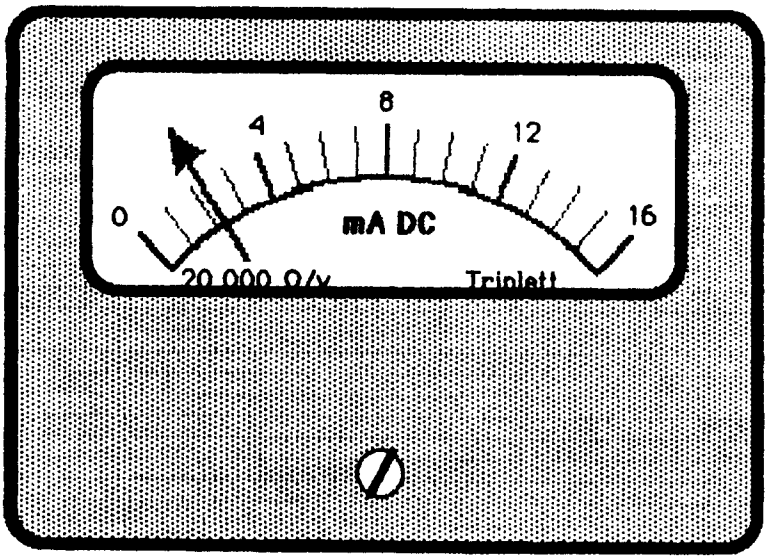


"Receiver Control Panel"

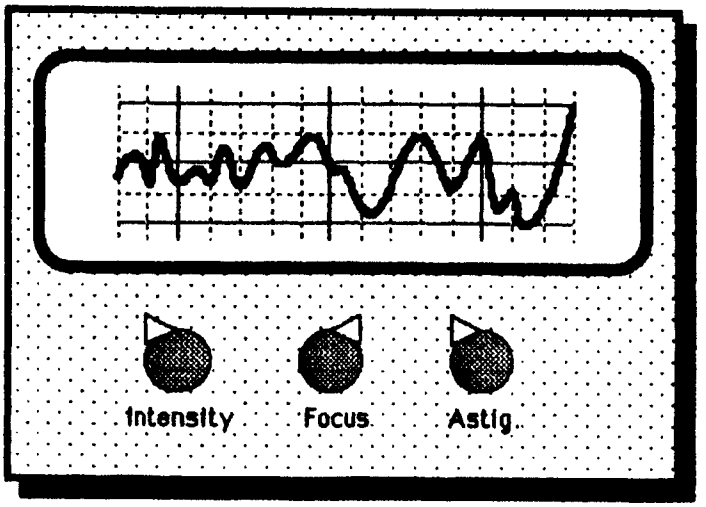
Modes 1-4 are selected by "push buttons" - activate by placing cursor on button and clicking mouse button.

Bias is monitored by a linear meter which is updated rapidly (~5-10 Hz).

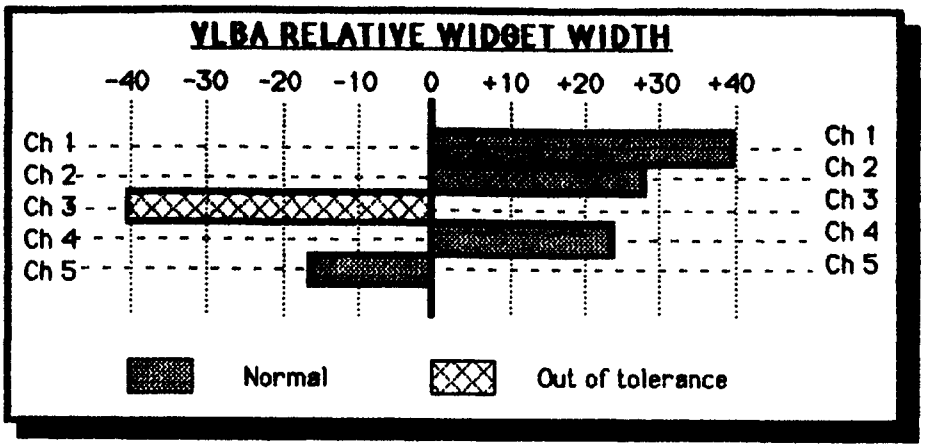
Bias can be adjusted by placing cursor on "knob" of "linear pot", pressing mouse switch and "dragging" to desired position.



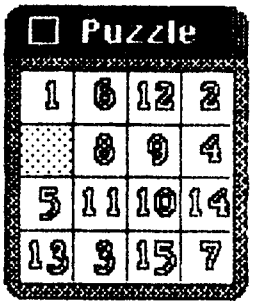
Any reasonable display is possible, according to taste.

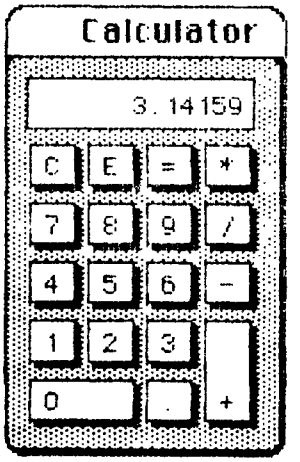


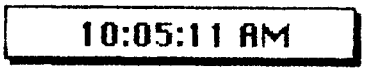
Oscilloscope displays are easy.



Dynamic bar charts



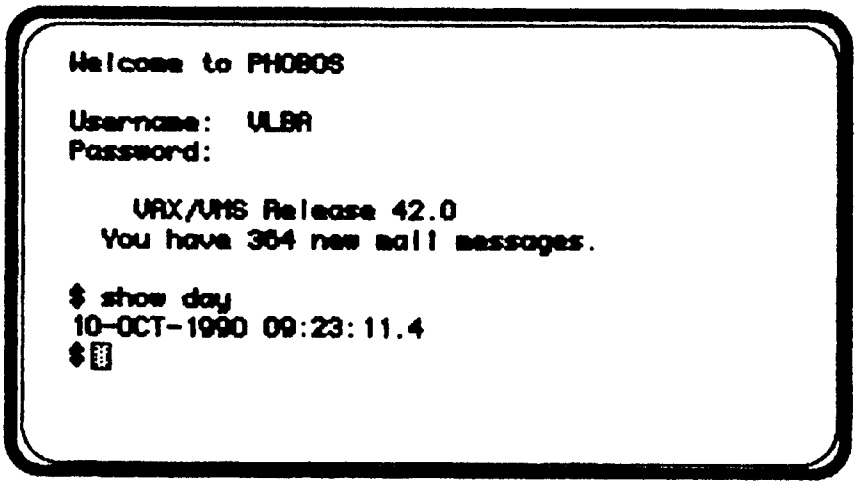




Clock

A few other useful items.

Cursor



VT100 Emulator