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IBM PC tachistoscope: II. Assembly language subroutines

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Segalowitz (1987) provided a BASIC routine for using an IBM PC or compatible as a tachistoscope. The present article supplies a set of Assembly language subroutines that perform most of the needed components that were included in the BASIC routine. The inherent benefit is, of course, speed. Each individual component's overload was timed at much faster than 1 msec; this rapid screen switching provides a solid basis for using the machine as a tachistoscope. All the subroutines have been successfully compiled and used with BASICA and the BASCOM compiler, and with the QuickBasic series (to Version 4.0).

SYNC.ASM. This subroutine waits for the beginning of the raster return so that the screen can be switched. The return itself takes just under 2 msec, allowing for screen switching in Assembly.

PAGER.ASM. This subroutine switches the screen page. As Graves and Bradley (1988) pointed out, QuickBasic 4.0 takes too long to switch screen pages to be useful in a tachistoscope paradigm. Unfortunately, in Assembly, the video interrupt does not change the active screen page, only the visual one, so the subject's keyboard response will be written to the last active screen (set, e.g., by the SCREEN statement in BASIC).

WAITNEW. This subroutine waits for a set number of raster returns, at 16.7 msec each, and then switches the screen page. For the PC to be used as a multichannel tachistoscope, some waiting period must be set for each page. Using a timing loop of some sort, even one provided by Segalowitz (1987) or Graves and Bradley (1987), can allow incremental inaccuracies with respect to the sync pulse. This subroutine allows for a set number of raster returns and then changes the screen. Of course, if the screen page indicated is the same as that currently viewed, there will be no perceived change.

TRIGGER. This subroutine sends out a signal through the communications (serial) port. This signal can be used as a trigger by several devices (such as an analog-to-digital converter for evoked potential use). The advantage of using this method, as opposed to sending the signal through BASIC, is that the signal is sent passively through the communications port, which does not have to be opened first.

TIMERSET and TMRREAD. These subroutines read the time from the internal clock as indicated by Graves and Bradley (1987). The versions presented here differ from theirs in that no DATA SEGMENT is required, making the collation of new subroutines into the library easier. I found these subroutines to work on several clones and compatibles: the Zenith Z-181, Compaq Deskpro 386, Power Systems 386, PS/2 Model 50, three no-name PC/XT clones, a no-name PC/AT clone, and the Tandy 1000. This means that the timing chip has not been altered significantly or at all across the new machines. The limitation on timing resolution inherent in these subroutines was discussed by Graves and Bradley (1988).

A compiled version of this library that is ready for linking using QuickBasic or BASCOM, together with the source code, is available from the author for $10 (Canadian) to cover postage, handling, and materials.

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