MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Project MAC

Artificial Intelligence Project
Memo 65--

Memorandum MAC-M-[illegible]
January 24, 19[illegible]

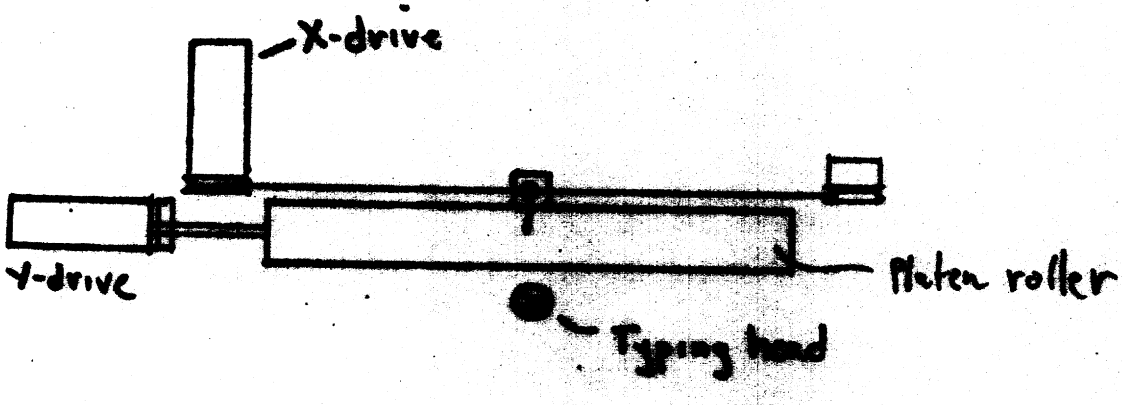
THE GRAPHICAL TYPEWRITER:

A Versatile Remote Console Idea

by M. L. Minsky

It would be useful to develop a combination typewriter-plotter along the lines described below. The device could be coupled to a telephone line with a reasonably small amount of electronics--mostly relays.

If one were to replace the 1-way carriage step-drive of a teletype or typewriter by a 2-way incremental drive, one has the Y-part of an X-Y plotter. Then one needs only an incremental X-drive and pen to complete the X-Y plotter section. It would probably be particularly easy to fit these additions to teletypes and IBM selectric typewriters since these have stationary "carriage" mechanisms, simplifying both paper-feed and the mounting of the X-recorder system. One could drive the system with high-speed stepping motors, e.g., the Sigma "cyclonome" family, or perhaps heavier-duty units. Increment times in the region of 1 millisecond are practical.


X-drive
Y-drive
Platen roller
Typing head

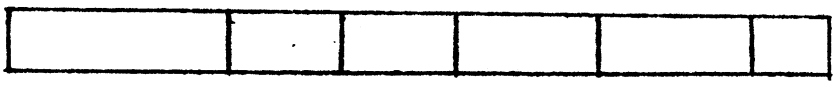
There will be some mechanical problems in making the reversible paper-feed reliable; the pen must write very close to the platen pinch-roller if a paper-tension system is to be avoided.

There is substantial value in having reversible small-step Y-feed on a computer-operated typewriter.

Computer Control

The Y-drive must have small increments to allow high-quality graphs. One may want to minimize the program complexity so that the instrument will be compatible with the teletype. To do this, without adding a clutch to engage a separate typewriter "line-feed character is decoded to transmit a fast volley of pulses to the Y-advance motor; a 5-bit counter or a fast stepping relay might serve for this.

For general X, Y control, the computer transmits a special "case shift" character, converting the console to X-Y plotter mode. In this mode one might use a 6-bit code



Timing Pulse X up Y up X down Y down Pen

and telephone lines ought to permit a reasonable rate of 100 or so points per second. More elegant codes are possible. One could even use the teletype timing chain in this, but then the speed would be slow.

Graphical input could then be obtained, at a slow but probably still useful rate by a 4 direction "stick"-control switch, with visual tracking of the following response of the X-Y pen. More elaborate schemes could

use devices or Telautograph type or the Teager design.

A prototype would make a fine M.E. project or thesis.

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