
Phototypesetting

Printing technology has been advancing since the invention of movable types by Gutenberg but it took a new dimension with the advent of phototypesetting. This electronic technology is now replacing the conventional hot metal technology of composing types because of its enormous typesetting capabilities by way of type size and type style. This technology coupled with computer has revolutionised the field of publishing. The phototypesetters come in a variety of electronic sophistication, imaging speed and versatility in typography. It is now possible to produce full pages of composed matter in the desired format on the display. The final image from the display screen is transferred to a photosensitive surface from which further copies are printed.

Photocomposition

Phototypesetting, which is some times erroneously referred to as cold type in contrast to hot type in metal typesetting, involves setting types by photographic method. In this method, a copy is composed one character at a time, and the image of character is focussed on a photographic paper or film. Because of the optical process involved, any type size can be produced from a single master image by enlarging or reducing the image through lenses. Various artistic effects in typography, such as expansion and condensation of letters, overlapping, slanting and distortion of character images can now be produced with much ease, better quality and high speed. While the actual process of typesetting is exposing the composed

text onto photosensitive surface; photo-composition covers the process of design, composition, typesetting, layout, formatting and reproduction, and is an intermediate phase in the printing cycle.

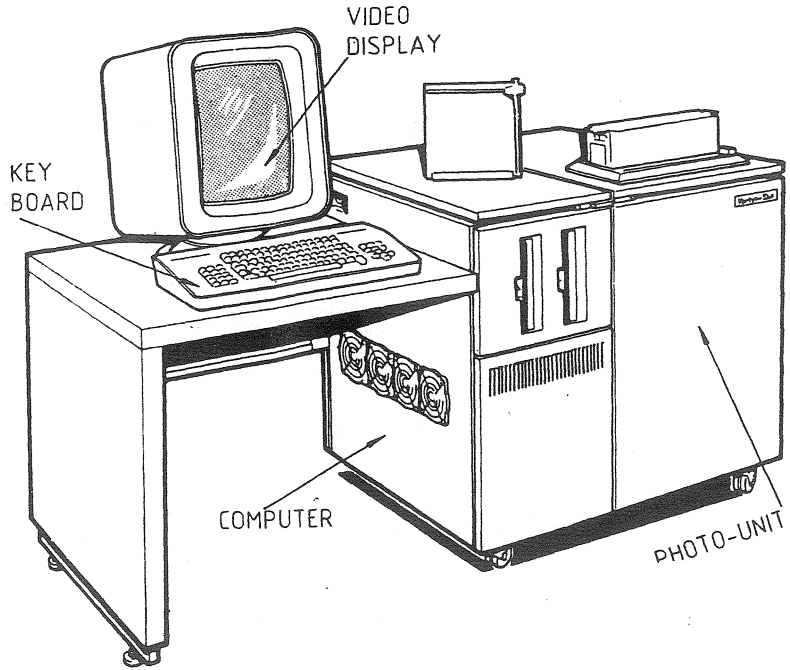
The input to the phototypesetter is given through a key board. The computer stores the input information and codes for various instructions, and performs functions like addition, deletion, justification of lines, hyphenation and formatting. The instructions from the keyboard through the computer are carried out in the photounit. Here desired character for the text are exposed on to photopaper or photosensitive plate through an optico-mechanical process. A visual display terminal (VDT) is usually attached to the keyboard on which the input information is displayed for editing, correcting and organising into desired format. This final information may be stored into computer memory, on floppy disc or other magnetic medium, or can be directly transmitted to the photounit. These units vary in complexity with the system and may be separated or combined into one master unit.

Components of Phototypesetter

Basically phototypesetting system consists of three units – a keyboard, a computer and a photounit.

Keyboard and the Computer

The keyboard, in addition to keys of an ordinary typewriter has special keys for formatting and editing instructions. It has keys for spacing between letters, words



A Phototypesetting Machine

and lines; for type size; for column length and other similar functions. Keyboards with Devnagari script, Greek letters and mathematical/special symbols are also available. In some types of keyboards the operator has to make decision about hyphenation and adjusting the line length for justification and for this, the operator is informed a few spaces before the end of line by an audible or light signal. In other type of keyboards this function of hyphenation and line justification is performed by computer thus increasing the speed of keyboarding since the operator can type continuously. The unjustified input is called as 'Idiot' copy and after the typesetting commands are given, the copy is set into desired type faces and size variations.

The keyboard is termed as online or direct input type and off-line or indirect input type. The former is an integral part of the typesetter and the text is directly projected in the photo unit as final output. In the latter, input information is first recorded on a storage medium and then the output plate is produced when required. Earlier, paper tape was used to record this information in the form of coded perforations. Later systems used magnetic tape, and now magnetic disc and floppy disc are popular for their high recording density and random access.

Video Display Terminal

Video Display Terminal is an important accessory attached to the keyboard and has

been responsible for the success of phototypesetting. It consists of a CRT (Cathode Ray Tube) screen which displays the input information. The operator can see the input and make corrections. Even later the operator can recall the input from the computer memory and edit/proofread the final copy on the screen itself.

Photounit

The unit receives information either from the computer memory or directly from the online keyboard. The earlier phototypesetters used a revolving font master and a number of different film fonts. A font is a particular type style such as Spartan, Bodoni, Gothic, Roman, Times and others. From these fonts, any type size can be projected on to photosensitive plate through lenses by enlargement or reduction. The character-image from the film is projected on the output film by a high intensity flash lamp via one of the lenses and a rotating mirror. Choice of the lens is determined by the point size required while the rotating mirror/prism scans each line to set characters side by side. Modern systems employ electronic beam/laser instead of light.

Editing on the Screen

Rapid changes in technology have made VDT an important tool from mere an editing device. Not only the editor can edit a prekey-boarded (stored) copy but also do page make up directly on the screen before the copy is set in type. The editor can add various commands like change in column width, type size, headlines and by lines. From VDT screen he can also obtain the length of the text required for laying out a page and review the justified copy complete with indentations, bold face indicators, hyphenation points and other copy editing requirements. Once

completely satisfied, he can send the final version online to a phototypesetter. It saves cost and time of proofreading. Even the desired blocks of characters from the stored text can be edited to alter, include or delete certain portions.

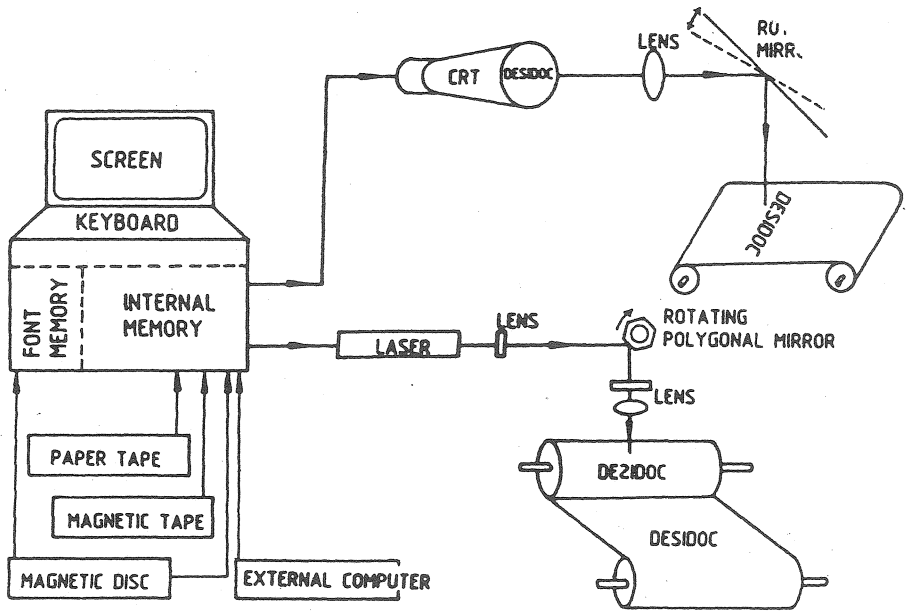
Cluster Approach

Since computer can process information many times the human speed, it remains idle most of the time while input is given or editing is done. To make better use of its processing power and to increase speed, a number of VDTs can be connected to a central computer, which can also be connected to a number of input devices.

For large amount of information in such cluster systems, a random access memory element, such as disc and suitable software is needed. Among the storage media, floppy disc can store more than 300 pages of information or 60,0000 characters. Rigid or hard disc can store several millions of characters and have faster access. Bubble memories can store ten times the information on disc in the same space.

Page Makeup

Software packages are now available which eliminate the need for conventional page meakeup process of cutting and pasting. In fact two trends in the development of modern typesetting are (i) enabling full-page makeup with graphics including half-tone and drawings, and (ii) replacing chemical processing of the exposed plate by dry output. In the computer assisted makeup (CAM) one can see on the screen the positions of the image elements, typeface, point size, line length, spacing, etc as required in the final print. There are two types of CAM, passive and interactive. The former



Schematic diagram of a Phototypesetter. The Photo Unit consists of either CRT or Laser Printer, Input device to the machine could be Paper Tape, Magnetic Tape, Magnetic Disc or External Computer

show only how information will be set in types according to the commands. The interactive CAM allows the operator to make changes in the typographic format on the screen enabling him to see how change will appear on the page.

Developments in Phototypesetting

Phototypesetting systems have gone a long way since the first machine designed in 1954. The first generation were called automatic typesetters with some automation over machine typesetting. In the second generation, these machines differed from metal using typesetters in function as well as in operation and were termed functional phototypesetters. Computers were employed in these machines in 1960 leading to their widespread adoption.

Digitised Typesetters

Third generation units are fully electronic phototypesetters. These utilise CRT and laser technology and are called digitised typesetters. Here characters are produced on a high resolution CRT screen by a series of minute lines or dots. The resultant image is then transferred to a photographic surface. In the more advanced alphanumeric photo-composition system characters are stored not as master images but as digital information. This is converted into dot line images on the CRT screen. For this, patterns of required characters are called out of memory and produced in CRT in the correct size on their precise locations in the page. This finalised composition is then beamed from the CRT to the output device. These solid appearing images, after imaging and printing

are actually patterns of characters consisting of adjoining scan lines just like the images on TV screen. The typographic quality of the imaged characters is determined by the resolution (i.e. scan lines per inch). More the resolution of screen, more smoother the characters will appear to the eye. The movement of electronic beam in such machines is fast enough to generate a page of text in about 15 seconds.

In a laser printer, laser beam takes the place of electron beam. The laser beam modulated with the electronic signals from the computer, scans horizontally across the entire page at once and generates a pattern of charge on the printing plate or drum. When direct paper output is required, toner is applied to drum which sticks to the charged regions and is ironed out onto paper by heat. For bulk printing, however, printing

plates are produced and used in conventional printing system.

The technology is advancing so fast that it is not possible to call any machine as latest. Further efforts to minimize the mechanical parts has been leading to greater speed and accuracy. The latest digital typesetters can create new letter forms with the flexibility of speeds upto 15,000 characters per second. The use of Optical Character Recognition and other reading devices have made possible the inclusion of graphic information like photographs and illustrations on a base alongwith the text. The editor can edit, do page makeup and correct proof on the screen reducing the time considerably, and enabling him to make the printed copies ready from the manuscript within a short time.

*A human being is not, in any proper sense,
a human being till he is educated*

— *Horace Mann*

*Learning makes a man fit company for
oneself*

— *German Proverb*