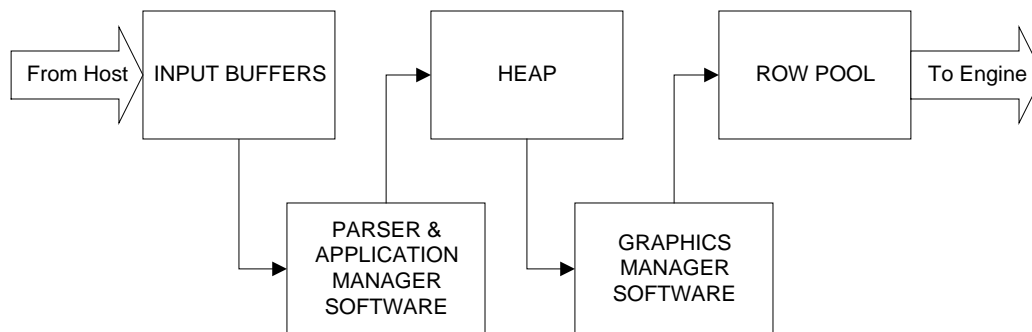


Buffer Management in Tally Line Printers

The Tally Line Printer software architecture implements a pipeline approach to data buffering. There are three areas where data is buffered in different formats. These buffers are the "I/O Buffer", the "Heap", and the "Row Pool".

The reason for this approach is to maintain optimal throughput for different types of data. For example, data for graphics languages such as Code V tends to be compute intensive and, in this case, data tends to be buffered in the Heap. High resolution print modes tend to be engine intensive and, in such cases, data tends to be buffered in the Row Pool. I/O buffering is affected by both compute speed and engine speed, as well as the host transmission speed.

The data flow is illustrated below:



The Parallel I/O Buffer actually consists of 8 buffers of 2K bytes each. The Serial I/O Buffer consists of 2 buffers of 1K bytes each. These buffers are allocated from the Heap.

The Row Pool has a maximum size of 256K bytes (100K in the T6050). The Row Pool consists of Row Data structures that contain a binary image of each dot row, a vertical coordinate, and the worst-case print mode for the dot row.

The Heap takes up all of the remaining available memory after the Row Pool has been allocated. This can range from about 100K in the T6050 to about 1.5 Megabytes in the T6215. The printable data in the Heap is in "Item format". There is a unique Item structure for each type of data such as text, bit-map graphics, bar codes, lines, etc. The Item structures contain the page coordinates for each item. The Items are processed as paper motion commands cause the current vertical coordinate to intersect with the vertical coordinates of the Item. The heap is also used for any dynamic memory allocation needed by emulation processing routines.

Because the data changes format as it makes its way through the pipeline, it is very difficult to give an absolute number for "buffer size". This metric is a holdover from the old serial and line printers and is no longer used in page printers. The latest generation line printer software is more like that of a page printer than the older serial and line printers. However, when using the case of printing full lines of text on a line printer with a fast host, empirical results show that only about 6K to 10K characters are buffered depending on the font style.

For applications that cannot tolerate such robust buffering, we have added the "Buffer Size" option to the control panel (described in the Operator Manual). The default is "Dynamic". When a fixed buffer size is selected (128, 256, 512, 1K, 2K, 4K, 8K, 16K), a single I/O Buffer is sized accordingly and data from the I/O Buffer is not processed until the Heap and the Row Pool are empty. Using fixed buffering will prevent the printer from maintaining full speed under many conditions.

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