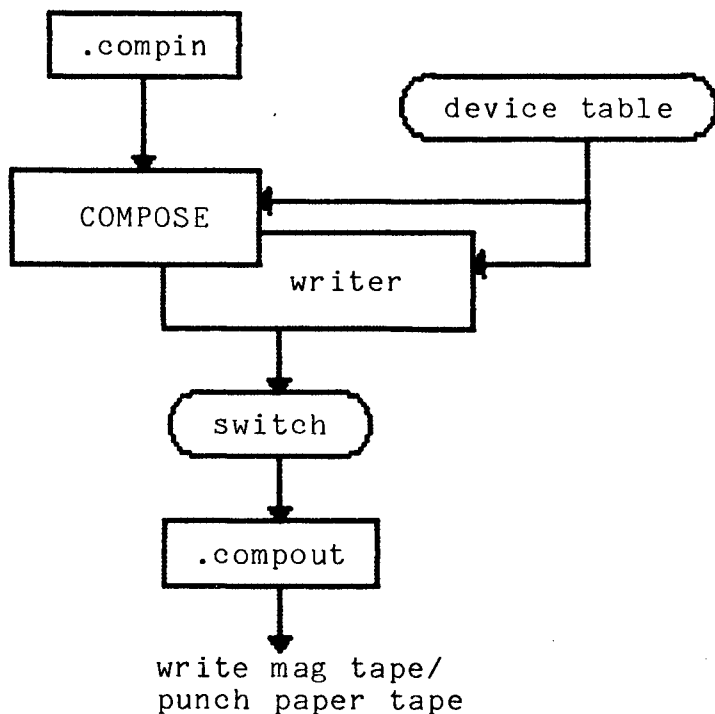To: Distribution

From: J. Falksen

Date: 78-08-02

Subject: Compose Device Tables

Compose is being extended to handle variable letterspace devices,
primarily phototypesetters. This requires compose to have much
more extensive device tables, since the characteristics of these
machines are much closer to Tektronix than Terminet.


```
        ┌──────────┐
        │ .compin  │
        └────┬─────┘        ┌───────────────────┐
             │         ⸨  device table  ⸩
             ▼              └─────────┬─────────┘
        ┌──────────┐◄────────────────┤
        │ COMPOSE  │                 │
        └────┬─────┴──────────┐      │
             │   │   writer    │◄────┘
             │   └──────┬──────┘
             ▼          │
          ⸨ switch ⸩◄───┘
             │
             ▼
        ┌──────────┐
        │ .compout │
        └────┬─────┘
             │
             ▼
      write mag tape/
      punch paper tape
```

Compose   references   the   device   table to   determine spatial
characteristics of the device: what is the horizontal/vertical
resolution, what are the character sizes, what is maximum page
width/length, etc.

I consider the writer routine to be a part of the device table.
This is the routine which knows how to output the page which com-
pose has assembled. It takes the internal compose structure,
which specifies a set of lines and their position, and makes an
output stream which the device can understand.

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Definitions

type - A rectangular piece or block, usually of metal, having on
   its upper surface a letter or character in relief.
      In photocomposition, there is no physical analogy to this
   exact thing. However, this and other terms are still used in a
   cause-and-effect relationship. There is the effect, say a let-
   ter on paper. The cause of this is still refered to as type,
   even though no metal slug did the work.

font - (British, fount) A complete assortment of type of one
   style and size.

pica - A unit used by typographers and printers to specify and
   measure such things as line length and page depth; six picas
   are approximately equal to one inch.

point - A unit of type measurement -- in the United States, the
   point is approximately 1/72nd of an inch; twelve points equal
   one pica.

point size - The dimension of a type from the top of the
   ascending letters (b, d, f, h, k, l) to the bottom of the
   descending letters (g, j, p, q, y).

EM - A unit of linear measure equal to the point size of the type
   in use; that is, a ten point EM is 10 points, etc. A fixed
   space of this width.

EM dash - A dash (-) one EM long that is approximately centered
   on the letters.

EM align dash - A dash (_) one EM long that aligns with the lower
   edge of the central portion of the lower case letters.

EN - A unit about one-half as wide as an EM of the same type. A
   fixed space of this width. This is usually the same width as
   the numerals. Thus the EN space may be used in tabular work to
   take the place of a numeral and still maintain proper spacing.

EN dash - A dash (-) one EN long that is approximately centered
   on the letters.

EN align dash - A dash (_) one EN long that aligns with the lower
   edge of the central portion of the lower case letters.

thin space - A fixed space used in the setting of certain text
   material; for example, mathematics. The width varies with the
   typesetting system in use. The width will usually be about 1/4
   EM and is usually the same width as a period.

spaceband - A variable space which is used between words. All spacebands set within a piece of copy do not necessarily have the same value.

justify - To make a line of type a desired length by spacing it, esp. so that full lines have even margins.

letterspacing - The moving of letters within a word further apart while attempting justification of a line. This is done when spacebands have reached a set maximum without having achieved justification.

superior - Printed high on a line of text, such as a superscript.

relative units - The EM is divided up into some number of equal parts. One of these parts is called a relative unit.

Internal line sizing is done in terms of these units in order to be able to utilize integer arithmetic. When a line length is given, it is converted into a unit measure. When a point size change is made, the unit measure is recalculated and the amount of line used up is recalculated.

The calculation used is:

$$\frac{units\_per\_EM \ * \ length\_in\_points}{points\_per\_EM} = length\_in\_units$$

N.B. points_per_EM is the same as point size.

= = = = = = = = = = = = = = = = =

A device table consists of this information:
- A possible reference to an attach description to be used when online output is requested. If there is no attach description present, then online output is not possible.
- A reference to a procedure which knows how to unload compose's internal page structure in a form useable by the device. This procedure will be called once for "startup", once for "cleanup" and once for each page to be output.
- A reference to a procedure which knows how to handle footnote reference strings. This procedure will be passed a footnote reference. It will pass back this reference within the appropriate control strings.
- A reference to a procedure which knows how to process artwork for this device.
- A reference to a procedure thich knows how to process graphics for this device.
- Maximum page width available in points.
- Maximum page length (if any) in points.
- Minimum vertical spacing increment in points.

- Minimum horizontal spacing increment in points.
- Minimum, maximum, and nominal spaceband widths in relative units.
- Maximum letterspace to use in relative units.
- Maximum number of pages in an output unit. An output unit may want to be controlled due to logistics problems: film magazine capacity, ease of rerun, etc.
- A reference to a device control (dvc) list.
- A reference to a font-change string array.
- A reference to a footnote reference font (if any). This is the font to use for footnote references.
- The number of relative units which an EM is divided into for this device.
- A list of font names available, and an associated reference to the corresponding font table.

A font table contains this information:
- A reference to a point size list. This indicates the valid point sizes which may be used with the font.
- A reference to an artwork part structure. This structure supplies all information necessary for the generation of large brackets, braces, and parentheses. (For future expansion)
- An array of character information. This array is indexed into with the unspec of a 9-bit ASCII character. The entry gotten supplies these data:
  - How wide the character is in relative units.
  - What media is used to supply the character. This is actually an index into the font-change array for the device.
  - A reference to the string which must be sent to the device to get the character. If the reference is null, then that character is not available on the device.

The dvc list contains this information:
- The 8-character name of the dvc. This is called in compose in two different ways.
            .dvc name xxx
    or   .ur zzzz%(name xxx)%zzzz
- A possible reference to a macro string. This is extra information which is passed to the processing routine.
- A reference to a procedure which knows how to process the specific dvc. This routine will be given the string "name xxx" in the calls above, along with the macro string. Any value which the procedure returns replaces the call in the line.

The font-change string array contains references to the strings which must be sent to the device to effect a change to a font. In order to be able to share font tables among different tables for the same machine, each font is assigned a unique number. That number is the index into this array. If compose indexes into this array and pulls a null reference, that media is not available. That could happen if one font table borrows a character from another table. If the first font table is included in a device table but the second is not this could arise.

In a future release there will be a compiler which produces these tables.