

Level 2 Compatibility: The setscreen and currentscreen Operators

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Level 2 Compatibility: The setscreen and currentscreen Operators

1 Introduction

With the introduction of PostScript[™] Level 2, control over halftoning in the PostScript interpreter has been greatly improved. Because of this, the **currentscreen** and **setscreen** operators have been extended to accept two sets of parameters.

This technical note documents a modification made to the behavior of **currentscreen** and **setscreen**, which was changed to increase the backward compatibility of Level 2. This document corrects early versions of the *PostScript Language Reference Manual, Second Edition*, and addresses possible compatibility conflicts between Level 1 and Level 2.

2 Operator Behavior

The **setscreen** and **currentscreen** operators behave differently in Level 1 and Level 2 implementations due to the expanded functionality in Level 2.

2.1 Level 1 Behavior

Halftoning in Level 1 interpreters is controlled by using the **setscreen** operator, which allows an application to specify a halftone screen by passing the following parameters:

frequency angle proc

Similarly, the currentscreen operator queries the current screen and returns

frequency angle proc

on the stack. In both cases, the *proc* is a PostScript language procedure responsible for determining the order in which pixels in a halftone cell are turned on. (Refer to section 6.4, "Halftones," in the *PostScript Language Reference Manual, Second Edition.*)

2.2 Level 2 Behavior

The concept of a *halftone dictionary* was introduced in Display PostScript[™] systems to support greater language-level control over halftoning. This functionality is also a standard in PostScript Level 2. A halftone dictionary is a dictionary object whose entries are parameters to the halftoning machinery. When the PostScript interpreter starts, a current halftone dictionary exists, much like a current screen in Level 1 interpreters.

Halftone dictionaries can be passed to the **sethalftone** operator, which reads the relevant keys and sets up the halftone screen appropriately. There are several halftone dictionary types that are specified with the required **HalftoneType** key.

A dictionary of halftone type 1 consists of required entries similar to the values passed to the **setscreen** operator in PostScript Level 1, but this dictionary may also contain several optional entries that provide greater control over the halftone screen. Although it is possible to use **setscreen** to set up a screen based on a halftone dictionary, it is preferable to use **sethalftone**. (See section 3, "Compatibility Implications.")

PostScript Level 2 extends the functionality of the **currentscreen** and **setscreen** operators to provide compatibility with the existing base of PostScript language code, while taking into account that the current halftone might be a dictionary rather than a spot function.

In PostScript Level 2 the current halftone can be defined either as a spot function or as a halftone dictionary. If it is a spot function, the **currentscreen** operator will behave the same way it would in Level 1, returning

frequency angle proc

on the operand stack. However, if the current halftone is a dictionary of type **HalftoneType** 1, rather than a screen, the **currentscreen** will return

frequency angle halftonedict

where *frequency* and *angle* are the values of **Frequency** and **Angle** extracted from the halftone dictionary. If the current halftone is a dictionary other than **HalftoneType** 1, **currentscreen** will return

60 0 halftonedict

where 60 and 0 are meaningless constants provided for language compatibility with existing PostScript language files. In similar fashion, the **setscreen** operator will accept both the Level 1 form for halftones

frequency angle proc

and the Level 2 form

num1 num2 halftonedict

If a halftone dictionary of type 1 is passed as the halftonedict, **setscreen** will interpret the arguments as

frequency angle halftonedict

frequency and *angle* will be copied into the halftone dictionary as **Frequency** and **Angle**. These values will override the **Frequency** and **Angle** keys in the halftone dictionary. If the dictionary is read-only, **setscreen** makes a copy of it before copying the values. If the halftone dictionary is a type other than 1, *frequency* and *angle* are ignored.

Some versions of the *PostScript Language Reference Manual, Second Edition* state that the *frequency* and *angle* parameters returned by **currentscreen** are always 60 and 0 in the case where the current halftone is a dictionary. However, this is true only if the halftone dictionary is not type 1. Similarly, the manual states that **setscreen** always ignores the *frequency* and *angle* values passed on the stack if the halftone is a dictionary. Again, this is only true if the dictionary is not a type 1 halftone dictionary.

Note The behavior described above is different from that described in some versions of the "PostScript Language Reference Manual, Second Edition."

3 Compatibility Implications

The ability to pass a halftone dictionary to the **setscreen** operator is provided for compatibility with existing PostScript language programs that execute **currentscreen**, save the results, and later execute **setscreen** to restore the old screen. It is preferable to use the **sethalftone** operator when explicitly setting a halftone dictionary as the current screen because it is more clear and because of the behavior described in the previous section.

Although the behavior of **setscreen** and **currentscreen** will be correct for most existing PostScript language files, there still remains a compatibility problem. In the case where the current halftone is not a type 1 dictionary, the **setscreen** and **currentscreen** operators behave as described in the *PostScript Language Reference Manual, Second Edition*, that is, **currentscreen** will return the meaningless constants 60 and 0, and **setscreen** will ignore the first two values passed to it. Since the effect of the **setscreen** and **currentscreen** operators are device-dependent, the effect of returning or setting halftones with these constants is at least no worse than using these operators in the first place.

Appendix: Changes Since Earlier Versions

Changes since August 8, 1991 version

• Document was reformatted in the new document layout and minor editorial changes were made.