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Hard-copy output of engineering drawings — Specification for the structure of control files

Sortie papier de dessins d'engineering — Spécifications pour la structure de fichiers de contrôle

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Contents

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 14985 was prepared by Technical Committee ISO/TC 171, *Document imaging applications*, Subcommittee SC 2, *Application issues*.

Annexes A to D are for information only.

Introduction

This International Standard has been prepared to facilitate the production of hard copies of engineering drawings by various types of printers, microfilm plotters, and other output devices. Such a standard is necessary because electronic image files can be stored in a variety of formats, such as TIFF, CALS, and HPGL. (See Annex A for examples of standard image file types.) Also, with the growing use of networks for the connection of hard-copy devices, many vendors are defining proprietary headers or set-up command strings in various ways. This International Standard aims to simplify the addition of new output devices to existing systems.

This International Standard provides information on setting up a plot control file containing (1) a copy of the image data file so that a hard copy can be produced or (2) a pointer to the location of the image data file so that the output device itself may retrieve the image data when the copy is made. In either case, the original image data file remains in the drawing database for future use.

This International Standard also provides information on setting up an optional job control file, which allows multiple plot control files to be grouped together and handled as one job. With a job control file, several sets of drawings may be produced, and they may be headed by banner pages, if desired.

Hard-copy output of engineering drawings — Specification for the structure of control files

1 Scope

This International Standard specifies the structure of a control file that can be used for the output of electronic images of engineering drawings to various forms of hard-copy output devices. This International Standard is not intended to define a minimum standard for the hard-copy device since different devices may support different features according to their complexity and intended use.

2 Normative references

The following normative documents contain provisions that, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 646:1991, *Information technology — ISO 7-bit coded character set for information interchange.*

ISO 6196-1:1993, *Micrographics — Vocabulary — Part 1: General terms.*

ISO 6196-2:1993, *Micrographics — Vocabulary — Part 2: Image positions and methods of recording.*

ISO 6196-3:1997, *Micrographics — Vocabulary — Part 3: Film processing.*

ISO 6196-4:1987, *Micrographics — Vocabulary — Part 4: Materials and packaging.*

ISO 6196-5:1987, *Micrographics — Vocabulary — Part 5: Quality of images legibility, inspection.*

ISO 6196-6:1992, *Micrographics — Vocabulary — Part 6: Equipment.*

ISO 6196-7:1992, *Micrographics — Vocabulary — Part 7: Computer micrographics.*

ISO 6196-8:1998, *Micrographics — Vocabulary — Part 8: Use.*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 6196 and the following apply.

3.1
X axis
horizontal axis of an image when the image is correctly oriented for viewing

3.2
Y axis
vertical axis of an image when the image is correctly oriented for viewing

3.3
plot control file
file used to control the way in which a drawing will be produced on a hard-copy plotting device

3.4
job control file
file used to control the way in which a sequence of drawings will be produced on a hard-copy plotting device

4 Structure of Plot Control File

4.1 Format

The format of the plot control file is shown in Table 1. The language used for the plot control file structure and text options shall be English, and the file shall be in ASCII text format. Text strings may be in any language.

4.2 General Requirements

The plot control file shall comply with the following general requirements:

a) The plot control file shall begin with a section key labelled [PLOT CONTROL FILE HEADER] and shall terminate with a section key labelled [END OF PLOT CONTROL FILE HEADER].

b) Each group of settings between the section keys shall start with a group key, which shall be enclosed in square brackets: [IMAGE FILE], [DRAWING OUTPUT], [PENS], [ANNOTATION], [MEDIA], and [FINISHING].

c) The header structure shall indicate whether the several settings following each group key are mandatory or optional.

d) A carriage return or line feed character, or both, shall separate entries in the file header.

e) The field identifier shall terminate with an equal sign ("=").

f) Blank lines and spaces shall be ignored except when enclosed within quotation marks.

g) Treatment of the data shall be case insensitive except for text strings to be used for annotation.

h) If the first valid character on a line is a semicolon, the line shall be considered a comment line. Comments shall occur only between the start section key and the end section key.

i) When the data in a plot file produces any type of conflict, the plotter shall produce the best plot it can rather than reporting an error.

4.3 Options

The following are some formatting options:

a) Upper or lower case characters may be used at will.

b) Blank lines and spaces may be inserted to improve readability. Spaces between words may be left out.

c) Additional parameters unique to a particular plotter may be included within any standard group.

d) Additional groups unique to a particular plotter may be added between the last standard group and the [END OF PLOT CONTROL FILE HEADER] section key.

4.4 Types of Variables

Four types of variables shall be used in the control file:

a) Integer variables — Integer numbers that are either signed or unsigned.

b) Number variables — Numbers that, where they represent dimensions, are assumed to be in units as defined by the UNITS entry. They may represent decimal numbers.

c) Text Option variables — Text strings that may take one of the permitted options. No quotation marks are needed.

d) Text String variables — Text strings that are for literal use by the output devices. Text strings shall be enclosed within quotation marks. Spaces and case sensitivity shall be preserved.

5 Field Identifier Groups

The first entry after the [PLOT CONTROL FILE HEADER] section key shall be UNITS, specified as dimensions such as MILLIMETRES or INCHES. For raster files, units may be PELS. If the UNITS entry is omitted, MILLIMETRES will be assumed.

5.1 Image Field Attributes [IMAGE FILE]

The parameters used in the image-attribute group shall be as follows:

a) Image File Name — Specifies the location of the image data as seen from the plotting device. It may be a data path and file name in a format appropriate to the system on which the data file is stored. If the data is to be appended to the plot control file, this entry shall be omitted.

b) Image File Type — Specifies the type of file containing the image data. Image files containing or implying some or all of the parameters allowable in the image file attribute group may be omitted from the plot control file header. If such parameters are specified also in the plot control file header, however, they overwrite the parameters in the image file. If parameters are neither in the image file nor in the plot control file header, the specified default values shall be used. (Some examples of standard image file types are given in Annex A.)

c) Byte Fill Order — Specifies whether the data is arranged with the most significant bit (MSB) or with the least significant bit (LSB) first.

d) Image File Size — Specifies in bytes the size of the complete image file, including any image file header.

e) Image File End Sequence — Specifies the end of an image file sent by a continuous transmission of data, such as a transmission using a parallel port. The sequence shall be defined as Hex notation numbers with comma separators.

f) Image Data Offset — Defines the number of skip bytes from the beginning of the image file (the point following the [END OF PLOT CONTROL FILE HEADER] key and its associated carriage-return or line-feed characters) to the first byte of data. Many image files have headers of their own that must be skipped in finding the start of data.

g) Image Width — Specifies the number of pixels in the direction of the scan line for raster images.

h) Image Length — Specifies the number of raster lines in the image for raster images.

i) Input Resolution — Specifies the number of dots per inch. If omitted, 200 DOTS PER INCH shall be assumed.

j) Original Drawing Size — Specifies drawing size in code, such as A3 or A4, and may be used in place of width and length.

k) Original Drawing Orientation — Specifies the orientation of the original drawing as either LANDSCAPE or PORTRAIT.

l) Origin — Specifies the origin of the co-ordinate system used by the image data. Acceptable values are CENTRE, TOP LEFT, BOTTOM LEFT, TOP RIGHT, and BOTTOM RIGHT.

5.2 Drawing Output Attributes [DRAWING OUTPUT]

The following parameters shall be used in the drawing output attribute group:

a) Plot Size — Defines the size of the output drawing as a drawing size code. Alternatively, the word FIT may be used to indicate that if necessary, the drawing may be automatically scaled down to fit the size attribute in the current [MEDIA] section. If ORIGINAL is entered, the output size is matched to the input-drawing size.

b) Width — Defines the output drawing width in units and is acted upon only if Plot Size is not given.

c) Length — Defines the output drawing length in units and is acted upon only if Plot Size is not given.

d) X Scale — Defines the horizontal axis of the output drawing as a percentage of the horizontal axis of the input-drawing, when the two axes differ in scale.

e) Y Scale — Defines the vertical axis of the output drawing as a percentage of the vertical axis of the input drawing when the two axes differ in scale.

f) Microfilm Reduction Ratio — Defines the reduction ratio of the plotted image to be reproduced on microfilm relative to the size of the input drawing.

g) Orientation — Defines the orientation of the output drawing as either LANDSCAPE or PORTRAIT.

h) Rotation — Defines the rotation of the output drawing relative to the input drawing in degrees (positive or negative). Positive rotation is anticlockwise.

i) X Offset — Defines the offset or displacement of the output drawing from its default printing position in units, in the X direction.

j) Y Offset — Defines the offset or displacement of the output drawing from its default printing position in units, in the Y direction.

k) Mirror — Specifies the axis about which the output drawing is to be mirrored.

l) Photometric — Reverses the photometric sign of the image data from black to white, or vice versa, if set to INVERT.

m) Quality — Defines the quality mode of the output. Acceptable values are DRAFT, INK SAVER, NORMAL, HIGH, ARCHIVE, ENHANCED, and PRESENTATION.

n) Colour — Defines whether colour plotting is required, indicated by either YES or NO.

5.3 Pen Attributes [PEN <n>]

Pen attributes shall be headed by pen number keys, which relate the attributes to a particular pen or sequence of pens. The pen number key may represent a single pen, as in [PEN 2], or a sequence of pens, as in [PEN 2,3,7-10,12]. Within each pen definition, the entries are as follows:

a) Width — Specifies the pen width in units (PELS, MILLIMETRES, or INCHES).

b) Colour — Specifies the name of the pen colour.

c) Pattern — Specifies the number of the pen pattern.

d) Line End — Specifies how the line is to be ended on vector drawings.

e) Line Join — Specifies how the lines are to be joined on vector drawings.

f) Transparency — Specifies the transparency of the pen.

5.4 Annotation Attributes [ANNOTATION]

Annotation attributes specify how information not part of the input drawing shall be added to the output drawing. The following are the annotation attributes:

a) Label — Specifies the text to be added to the output drawing.

b) Position — Specifies whether the annotation shall be placed on the outside TOP, LEFT, RIGHT, or BOTTOM of the drawing relative to the plotted image.

c) Alignment — Specifies whether the annotation shall be aligned LEFT, CENTRE, RIGHT, or JUSTIFIED within the position specified above.

d) Size — Specifies the point size of text.

e) Font — Specifies the text typeface.

f) Overlay — Specifies that the text should overlay the input-drawing content (ON) or that the plot media shall not be ejected after plotting so that the following plotted image overplots the current one (OVERPLOT NEXT).

g) Overlay Type — String used by some devices having various choices of overlay type.

h) Hollerith Punch — String used by microfilm aperture card plotters to define the data to be punched on the card. This string includes characters corresponding to the film window area that should normally be space characters.

i) Hollerith Print — String used by microfilm aperture card plotters to define the data to be printed on the card.

5.5 Media Attributes [MEDIA]

The MEDIA group of parameters define on which medium the drawing shall be output where the device supports multiple choices:

a) Type — Specifies the type of medium, such as FILM, PAPER, POLYESTER, or MANUAL.

b) Size — Specifies the sheet size of the output medium.

c) Width — Specifies the width of the sheet or roll if size is not given.

d) Length — Specifies the length of the output media if size is not given.

e) Cut — Specifies the mode of the automatic cutter.

f) Saver — Specifies that the media saver mode is active, changing the placement and orientation of the plots for greatest efficiency of media usage. Depending on the plotter, this may be achieved in various ways.

g) Copy Count — Specifies the number of copies to be produced from the current drawing. If the image file itself contains a copy count, the total number of copies will be the product of Copy Count and the image file's copy count.

5.6 Finishing Attributes [FINISHING]

The finishing attributes determine how the output device will process the media once the output drawing has been transferred to the output media:

a) Folding — Specifies whether the drawing shall be folded.

b) Fold Type — Specifies how the folding shall be carried out.

c) Punch Type — Specifies how drawings are to be punched if they are to be punched in preparation for binding.

d) Rolling — Causes the drawing to be automatically rolled.

e) Banner Page — Produces a banner page before the current drawing.

f) Banner Text Line <n> — Defines the last line of text to be printed on the banner page.

6 Multiple Choice Options

In certain instances, the file entries are constrained to take one of two or more options. These parameters are indicated as text option in the 'Type of entry' column of Table 1. Table 2 lists the choice of options for the type of entry and gives the default value assumed for any optional entry that is missing.

7 Drawing Sets

If only one set of drawings is required or if multiple sets of drawings are to be generated by producing a succession of plot control files, the plot control files described above are all that is needed. To produce drawings in distribution sets, however, some output devices use sorting or collating techniques.

To support these features, a wrapper file, called a ‘job control file’, needs to be defined. The job control file shall contain several plot control files, each relating to a given drawing within the set, and shall contain information on the make-up and packaging of the sets.

The job control file and its structure is shown in Table 3. The syntax rules and types of variables used in the file are the same as those specified in 4.2 and 4.4 for plot control files. The job control file header shall begin with a section key labelled [JOB CONTROL FILE] and shall terminate with a section key labelled [END OF JOB CONTROL FILE]. The end section key shall be followed by one or more plot control file headers. An example of a job control file can be found in Annex D.

7.1 Job Control File Attributes

a) Number of Files — Specifies the number of plot control files used to produce the set of drawings.

b) Collation — ENABLES specified drawings to be collated into sets.

c) Set Copy Count — Defines the number of sets of copies of the specified files to be produced. Note that individual plot control files in the set may themselves define multiple copies of a particular drawing; in such cases, the total number of copies produced will be the product of the Plot control file’s copy count, Image file’s copy count, and Set copy count.

d) Set Order — Sets the order in which the plot control files within a set shall be handled. When this parameter is set to SIZE or MEDIA, the plot files are handled in ascending order of output-drawing size or by media type. If Collation is ON, this order shall be maintained within each collated set. If no set order is specified, the drawings will be plotted according to the order of the plot files.

e) Job Banner Page — Causes a job banner page to be printed with specified text.

f) [SET <N>] — Indicates the start of the parameter list that defines the format of output for set ‘n’.

   1) Banner Media — Specifies the medium for the set banner page.

   2) Banner Size — Specifies the medium size for the set banner page.

   3) Banner Text Size — Specifies the size of text for the set banner page in points.

   4) Banner Text Font — Specifies the text font for the set banner page.

   5) Banner Text Line <n> — Specifies the "n" th line of text to be printed on the set banner page.

6) Force Label — Forces the label to the specified string for the set, irrespective of the label specified in the plot control file.

7) Force Copy Count — Forces the copy count to the specified number, irrespective of the image file copy count and the plot control file copy count.

8) Maximum Plot Size — Limits the plot size irrespective of the specified output drawing size.

9) Force Media Type — Specifies the media type for the set.

10) Force Media Size — Specifies the media size for the set.

11) Force Media Cut — Specifies the automatic cutting mode for the set.

12) Force Media Saver — Specifies the mode of the media saver for the set.

13) Force Finish Folding — Specifies the mode of the automatic folder for the set.

14) Force Finish Punch Type — Specifies the mode of automatic punching for the set.

15) Force Finish Rolling — Specifies the mode of the automatic rolling for the set.

7.2 Plot Control File Definition

One or more plot control file entries shall follow the job control file attributes, which shall be terminated by the end section key. The number of plot control file entries shall depend on the Number of Files parameter given. These files may be the complete plot control file as specified in clauses 4 to 6, the data path and file name of the plot control file, or a combination of both. Some examples of plot control files can be found in annexes B and C.