

Expected Useable Lifetime of Different Electronic Document Formats

INTRODUCTION

Format Conversions

As we drag and drop from email to a word processor documents, and as we drag and drop from a word processor document to an HTML (HyperText Markup Language) web page, we assume that the copy and pasted information stays the same. The following text file shows why the copy and pasted information never stays exactly the same. Often the formatting is changed, and not infrequently, the text is also changed in the reformatting that occurs when one drags and drops.

Even more unfortunate, when one opens a document created by a previous version of document creation software, the formatting of the document is 'automatically' converted to the format of the current version of the document creation software. This conversion frequently introduces changes in the physical appearance of documents and can even change the text of a document.

From looking at the text below, and most particularly from looking at the word "Photon" on page 11, one can see that the format of the file that defines a page is much more complex than the image one sees when one prints the page. This complexity is at the root of format conversion problems.

As a document manager, one must avoid document conversions if at all possible. For the document conversions that are unavoidable, one must document the conversions as thought they were a break in the chain of custody of the document, requiring reauthoring by a person competent in the subject matter of the document. If this reauthoring cannot be done, a notice should be given to all readers that the format, and perhaps the textual content of the document may have been altered. An example would be a notice that the document was created in Microsoft Word 95 and was being viewed or printed using Microsoft Word 2000. Such a notice is given when a document is converted at opening. A document manager has a responsibility to alert users to the actual effects of this 'automatic' conversion.

As records management moves into electronic document management, records managers become responsible for the effects of converting documents from one format, such as the one shown below, to a growing number of other formats. A solution to this problem is to require that at least one copy of each document be signed off and submitted by the document creator in a format that is not expected to change, such as the Adobe PDF (Portable Document Format).

The following text file describes the one page illustration entitled "How Digitizing Works for Non-Technical Manager" which appears at the end of this document. This file is in the form of a program written in PostScript, a Page Description

Language (PDL). It is called an Encapsulated PostScript (EPS) format file.

The EPS file is almost entirely in ASCII (ANSI (American National Standards Institute) Standard code of Information Interchange), so it is easily read by a person. For some native formats, such as Microsoft Word, much of the information in document definition files is in binary tables. Microsoft Office 2000 stores documents in XML (eXtensible Mark-up Language) which is in ASCII, but much of the housekeeping information, such as the user's view of the document, is stored in a separate data structure that contains binary tables.

Format Lifetimes

For native format, such as Microsoft Word, a 3 to 9 month lifetime is generous because the appearance of archive document files could be changed by the simple action of displaying the files with a newer bug fix revision of Microsoft Word. These newer bug fix versions would be found on the most recently purchased computers in an organization. Microsoft delivers the latest bug fix version of Microsoft Word when one orders a specific edition of Microsoft Word. These bug fixes, that are distributed around large offices based on the vintage of the computers, cause the display of document files to change slightly, depending on the interaction of new and old document formatting bugs within a given edition Microsoft Word.

The PDF (Portable Document Format) text or vector format (for outline fonts) will probably last 30 to 50 years. This is due to Adobe's dedication to mathematical precision and the quality of the file formats. It is also promoted by the fact that Adobe will sue any vendor that produces PDF files that do not conform to the Adobe PDF format standards.

Raster scanned, or rasterized (using Adobe Photoshop) text files will probably last 500 to 1 thousand years. This is because the Group 4 compression format, used by PDF and by TIFF (Tagged Image File Format), created by Aldus Inc. in the 1980s, is very simple and is viewed as a very light level of encryption by hackers who can easily break the code and display the document images.

Note to Readers

Updates and More Detailed Descriptions

When using the information in this article, please check the website <http://www.ArchiveBuilders.com> for updates. The version number of this article is just before the page number below. The website also has

articles that provide more details on some of the terms and concepts in this article.

Comments

Please let us know how you like this paper, or if you had any questions. What would you like to see in the future? Also, please let us know where you saw this paper. For more, and the most recent version of this article, please visit our web site at <http://www.ArchiveBuilders.com>

Please send your comments via email to SteveGilheany@ArchiveBuilders.com. Tel: +1 310-937-7000. Fax: +1 310-937-7001. Also, please let us know where you saw this article.

Acknowledgements

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Note to Editors

Paper 22023v006

We will continue to update these articles as we get comments. Please contact us for the most current version before you publish. Also, please request permission to publish the article. Permission will be given freely for most purposes.

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Dividing this Article into Parts for Serialization

If you decide to divide this article into parts please print at least the updates, comments, and acknowledgements sections in each of the parts along with:

'by SteveGilheany@ArchiveBuilders.com'.

Bio

Steve Gilheany, BA in Computer Science, MBA, MLS Specialization in Information Science, CDIA (Certified Document Imaging System Architect), AIIM Master (MIT), and AIIM Laureate (LIT), of Information Technologies, CRM (Certified Records Manager, ARMA) has eighteen years experience in document imaging and is a Sr. Systems Engineer at Archive Builders.

Author

Steve Gilheany is a Sr. Systems Engineer at Archive Builders. He has worked in digital document management and document imaging for nineteen years.

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His experience in the application of document management and document imaging in industry includes: aerospace, banking, manufacturing, natural resources, petroleum refining, transportation, energy, federal, state, and local government, civil engineering, utilities, entertainment, commercial records centers, archives, non-profit development, education, and administrative, engineering, production, legal, and medical records management. At the same time, he has worked in product management for hypertext, for windows based user interface systems, for computer displays, for engineering drawing, letter size, microform, and color scanning, and for xerographic, photographic,

newspaper, engineering drawing, and color printing.

In addition, he has nine years of experience in data center operations and database and computer communications systems design, programming, testing, and software configuration management. He has an MLS Specialization in Information Science and an MBA with a concentration in Computer and Information Systems from UCLA, a California Adult Education teaching credential, and a BA in Computer Science from the University of Wisconsin at Madison. His industry certifications include: the CDIA (Certified Document Imaging System Architect) and the AIIM Master (MIT), and AIIM Laureate (LIT), of

Information Technologies (from AIIM International, the Association of Information and Image Management, www.AIIM.org), and the CRM (Certified Records Manager) (from the ICRM, the Institute of Certified Records Managers, an affiliate of ARMA International, the Association of Records Managers and Administrators, www.ARMA.org).

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Sample image file in native format:

The following text file describes the one page illustration entitled "How Digitizing Works for Non-Technical Manager" which appears at the end of this document. This file is in the form of a program written in PostScript, a Page Description Language (PDL). It is called an Encapsulated PostScript (EPS) format file.

It is almost entirely in ASCII (ANSI (American National Standards Institute) Standard code of Information Interchange), so it is easily read by a person.

This file is 143 pages long when set in 8 point type. Some of the file was deleted to save space.

=====>>> This first part is a preamble that sets up the PostScript environment in which the page is defined.

```
DE-`a_s`~~~~~`Es` Š@`ÿÿ%!PS-Adobe-3.0 EPSF-3.0
%%Creator: Adobe Illustrator(R) 8.0
%%AI8_CreatorVersion: 8
%%For: (Steve Gilheany) ( )
%%Title: (22021v026 How Digitizing Works for Non-Technical Manager.eps)
%%CreationDate: (3/19/00) (11:13 AM)
%%BoundingBox: -222 -840 1088 775
%%HiResBoundingBox: -221.4863 -839.75 1087.6953 774.5938
%%DocumentProcessColors: Black
%%DocumentFonts: Helvetica
%%DocumentNeededFonts: Helvetica
%%DocumentSuppliedResources: procset Adobe_level2_AI5 1.2 0
%%+ procset Adobe_typography_AI5 1.0 1
%%+ procset AGM_Gradient 1.0 0
%%+ procset Adobe_ColorImage_AI6 1.3 0
%%+ procset Adobe_Illustrator_AI5 1.3 0
%%+ procset Adobe_cshow 2.0 8
%%+ procset Adobe_shading_AI8 1.0 0
%AI5_FileFormat 4.0
%AI3_ColorUsage: Black&White
%AI3_IncludePlacedImages
%AI7_ImageSettings: 1
%%CMYKProcessColor: 1 1 1 1 ([Registration])
%%AI6_ColorSeparationSet: 1 1 (AI6 Default Color Separation Set)
%%+ Options: 1 16 0 1 0 1 1 1 0 1 1 1 1 18 0 0 0 0 0 0 0 0 -1 -1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 0 1 2 3 4
%%+ PPD: 1 21 0 0 60 45 2 2 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 ( )
%AI3_TemplateBox: 306.5 395.5 306.5 395.5
%AI3_TileBox: 18 18 594 774
%AI3_DocumentPreview: PC_ColorTIFF
%AI5_ArtSize: 612 792
%AI5_RulerUnits: 2
%AI5_ArtFlags: 1 0 0 1 0 0 1 0 0
%AI5_TargetResolution: 800
%AI5_NumLayers: 1
%AI8_OpenToView: 83 907 2 1006 645 18 1 1 11 83 1 1
%AI5_OpenViewLayers: 7
%%PageOrigin:18 18
%%AI3_PaperRect:-18 774 594 -18
```

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```
%3AFF7D7DFD04527DF7DA87DA8FD047D527D7D52A8FD0BFFA8FD06FF52
%FFFFFFA8FFA8FD3AFFA852522752277DF82752A8FFFFFFA8FF7DFF52A8FD0EFF
%7DFD06FF7DFF7DFF7DFD3AFFA87DFD04522752FFA8FFFF7DA8FD077DFD
%0CFFA8FD09FFA8FFA8FD3AFFA852522752277D7DA8A8FD04FFA87DFF7DA8
%FD0EFF7DFD09FF7DFF7DFD3AFFA87D275227527DA8A8A8FD047D527D7D7D
%527D7DA8FD0BFFA8FD09FFA8FFA8FD3AFFA852FD04277D7DFD05FFA8FF7D
%FF7DA8FD0FFF7DFD08FF7DFF7DFD3AFFA87D275227277D52FD05FFA8FD07
%7DFD0DFF7DFD07FFA8FFFA8FD3AFFA85227F827277D7DFF7DFF7DFF7DFF7D
%7DFF527DFFA87DA87DA87DA87DA87DA87D52A8FD06FFA8FF7DFF7DFF7DFF7D
%FF7D7D2727F8277DA8FD04FFFD047D527D7D7D52A8FD0CFFA8A8FD06FFA8
%FFFFFFA8FD3AFFA82727F827F87D7DFD05FFA8FF7DFFA8A8FD10FF7DFD05FF
%7DFF7DFF7DFD3AFFA87DF827F8277DA8FD04FF7DA87D7D7D52527D7DFFA8
%A87DA8A8A87D7D7DA87DFD04A8FD08FFA8FD3AFFA82727F8F8F85227FD06
%FFA87DFFA8FD04FFA8FD067D52FD057DA8A8A8FFA8A8FD04FF7DFD3AFFA8
%7DF827F8F8A8FD11FFA8FFA8FFA8FFA8FFA8FFA8FFA8FF52FFA8FFA8FFA8
%A8FD3AFFA8FD0FFFA8F87D7DFF7DFF7DFF7DFF7DFF7DFF7DFF7DFF7DFF7DFF
%A8A8FFA8FF7DFF7DA8FD06FFA8FD10FFA8FD3AFFA8FD0CFF7DA87DA8FD04
%7D527DFD05FFA87D7D27FF7DA87DA87DA87DA87D852FF7DFF7DFF7DFF7DFF7D
%FF7D7D52FF7D7D52A87DA87D7D7DA87D7D7DA87DA8A8A852A8FD3AFFA8FF
%FFA8FFA8FD0FFF27FD17FF7DFD3AFFA8FF7D7DA8A8FFFA8FFA8FFA8A8A8
%FF7DFF7DA8FFA8FFA8FFA87DFF7DFF7DFF7DFF7DFF7DFF7DFF7DFF7DFF7DFF
%A8FD3AFFA8FFFA8FD05FF7DFF7DFF7DFF7DFF7DFF7DFF7DFF7DFF7DFF7DFF7D
%7D7DA87D7D7DA87D7D7DA87DA87DA87DA852FD3AFFA8FFFD047DF8FD26FF
%A8FD39FFA852527D527D2752277D2752277D2752277D27522752275227522752
%2752277D275227522752277D2752277D527D527D527D527D527D527D527D527D
%FDADFF7DFD2CA87DFD3AFF7DFD2CFFA8FD3AFFA8FD2CFF7DFD3AFF7DFD2C
%FFA8FD3AFFA8FD2CFFA8FD3AFF7DFD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7D
%FD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7DFD2CFFA8FD3AFFA8FD2CFF7DFD3A
%FF7DFD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7DFD2CFFA8FD3AFFA8FD2CFFA8
%FD3AFF7DFD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7DFD2CFFA8FD3AFFA8FD2C
%FF7DFD3AFF7DFD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7DFD2CFFA8FD3AFFA8
%FD2CFFA8FD3AFF7DFD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7DFD2CFFA8FD3A
%FFA8FD2CFF7DFD3AFF7DFD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7DFD2CFFA8
%FD3AFFA8FD2CFFA8FD05FF7DFD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7DFD2C
%FFA8FD3AFFA8FD2CFF7DFD3AFF7DFD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7D
%FD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7DFD2CFFA8FD3AFFA8FD2CFFA8FD3A
%FF7DFD2CFFA8FD3AFFA8FD2CFF7DFD3AFF7DFD2CFFA8FD3AFFA8FD2CFFA8
%FD3AFF7DFD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7DFD2CFFA8FD3AFFA8FD2C
%FFA8FD3AFF7DFD2CFFA8FD3AFFA8FD2CFF7DFD3AFF7DFD2CFFA8FD3AFFA8
%FD2CFFA8FD3AFF7DFD2CFFA8FD3AFFA8FD2CFFA8FD3AFF7DFD2CFFA8FD3A
%FFA8FD2CFFA8FD3AFF7DFD2CFFA8FD3AFFA8FD2CFF7DFD3AFF52A87DA87D
%A87DA87DA87DA87DA87DA87DA87DA87DA87DA87DA87DA87DA87DA87DA87D
%A87DA87DA87DA87DA87D7D
%%EndData
%%EndComments
%%BeginProlog
%%BeginResource: procset Adobe_level2_AI5 1.2 0
%%Title: (Adobe Illustrator (R) Version 5.0 Level 2 Emulation)
%%Version: 1.2 0
%%CreationDate: (04/10/93) ( )
%%Copyright: ((C) 1987-1996 Adobe Systems Incorporated All Rights Reserved)
userdict /Adobe_level2_AI5 26 dict dup begin
  put
  /packedarray where not
  {
    userdict begin
    /packedarray
    {
      array astore readonly
    } bind def
    /setpacking /pop load def
    /currentpacking false def
  } end
  0
} if
pop
userdict /defaultpacking currentpacking put true setpacking
/initialize
{
  Adobe_level2_AI5 begin
} bind def
/terminate
```

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```
{
  currentdict Adobe_level2_AI5 eq
  {
    end
  } if
} bind def
mark
/setcustomcolor where not
{
  /findcmykcustomcolor
  {
    (AI8_CMYK_CustomColor)
    6 packedarray
  } bind def
  /findrgbcustomcolor
  {
    (AI8_RGB_CustomColor)
    5 packedarray
  } bind def
  /setcustomcolor
  {
    exch
    aload pop dup
    (AI8_CMYK_CustomColor) eq
    {
      pop pop
      4
      {
        4 index mul
        4 1 roll
      } repeat
      5 -1 roll pop
      setcmykcolor
    }
    {
      dup (AI8_RGB_CustomColor) eq
      {
        pop pop
        3
        {
          1 exch sub
          3 index mul
          1 exch sub
          3 1 roll
        } repeat
        4 -1 roll pop
        setrgbcolor
      }
      {
        pop
        4
        {
          4 index mul 4 1 roll
        } repeat
        5 -1 roll pop
        setcmykcolor
      } ifelse
    } ifelse
  }
} def
} if
/setAIseparationgray
{
  false setoverprint
  0 setgray
  /setseparationgray where{
    pop setseparationgray
  }{
    /setcolorspace where{
      pop
      [/Separation (All) /DeviceCMYK {dup dup dup}] setcolorspace
      1 exch sub setcolor
    }
  }
}
```

Expected Useable Lifetime of Different Electronic Document Formats

```
        }{
            setgray
        }ifelse
    }ifelse
} def

/!gt38? mark {version cvr cvx exec} stopped {cleartomark true} {38 gt exch pop} ifelse def
userdict /deviceDPI 72 0 matrix defaultmatrix dtransform dup mul exch dup mul add sqrt put
userdict /level2?
systemdict /languagelevel known dup
{
    pop systemdict /languagelevel get 2 ge
} if
put
/level2ScreenFreq
{
    begin
        60
        HalftoneType 1 eq
        {
            pop Frequency
        } if
        HalftoneType 2 eq
        {
            pop GrayFrequency
        } if
        HalftoneType 5 eq
        {
            pop Default level2ScreenFreq
        } if
    end
} bind def
userdict /currentScreenFreq
level2? {currenthalftone level2ScreenFreq} {currentscreen pop pop} ifelse put
level2? not
{
    /setcmykcolor where not
    {
        /setcmykcolor
        {
            exch .11 mul add exch .59 mul add exch .3 mul add
            1 exch sub setgray
        } def
    } if
    /currentcmykcolor where not
    {
        /currentcmykcolor
        {
            0 0 0 1 currentgray sub
        } def
    } if
    /setoverprint where not
    {
        /setoverprint /pop load def
    } if
    /selectfont where not
    {
        /selectfont
        {
            exch findfont exch
            dup type /arraytype eq
            {
                makefont
            }
            {
                scalefont
            } ifelse
            setfont
        } bind def
    } if
    /cshow where not
    {
```

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```
        /cshow
        {
            [
                0 0 5 -1 roll aload pop
            ] cvx bind forall
        } bind def
    } if
} if
cleartomark
/anyColor?
{
    add add add 0 ne
} bind def
/testColor
{
    gsave
    setcmykcolor currentcmykcolor
    grestore
} bind def
/testCMYKColorThrough
{
    testColor anyColor?
} bind def
userdict /composite?
1 0 0 0 testCMYKColorThrough
0 1 0 0 testCMYKColorThrough
0 0 1 0 testCMYKColorThrough
0 0 0 1 testCMYKColorThrough
and and and
put
composite? not
{
    userdict begin
    gsave
    /cyan? 1 0 0 0 testCMYKColorThrough def
    /magenta? 0 1 0 0 testCMYKColorThrough def
    /yellow? 0 0 1 0 testCMYKColorThrough def
    /black? 0 0 0 1 testCMYKColorThrough def
    grestore
    /isCMYKSep? cyan? magenta? yellow? black? or or or def
    /customColor? isCMYKSep? not def
    end
} if
end defaultpacking setpacking
%%EndResource
%%BeginResource: procset Adobe_typography_AI5 1.0 1
%%Title: (Typography Operators)
%%Version: 1.0 1
%%CreationDate:(6/10/1996) ()
%%Copyright: ((C) 1987-1996 Adobe Systems Incorporated All Rights Reserved)
currentpacking true setpacking
userdict /Adobe_typography_AI5 68 dict dup begin
put
/initialize
{
begin
begin
begin
    Adobe_typography_AI5 begin
    Adobe_typography_AI5
    {
        dup xcheck
        {
            bind
        } if
        pop pop
    } forall
end
end
end
    Adobe_typography_AI5 begin
} def
/terminate
```

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```
{
  currentdict Adobe_typography_AI5 eq
  {
    end
  } if
} def
/modifyEncoding
{
  /_tempEncode exch ddef
  /_pntr 0 ddef
  {
    counttomark -1 roll
    dup type dup /marktype eq
    {
      pop pop exit
    }
    {
      /nametype eq
      {
        _tempEncode /_pntr dup load dup 3 1 roll 1 add ddef 3 -1 roll
        put
      }
      {
        /_pntr exch ddef
      } ifelse
    } ifelse
  } loop
  _tempEncode
} def
/havefont
{
  systemdict /languagelevel known
  {
    /Font resourcestatus dup
    { exch pop exch pop }
    if
  }
  {
    systemdict /FontDirectory get 1 index known
    { pop true }
    {
      systemdict /fileposition known
      {
        dup length 6 add exch
        Ss 6 250 getinterval
        cvs pop
        Ss exch 0 exch getinterval
        status
        { pop pop pop pop true }
        { false }
      } ifelse
    }
    { pop false }
  } ifelse
} ifelse
} def
/TE
{
  StandardEncoding 256 array copy modifyEncoding
  /_nativeEncoding exch def
} def
/subststring {
  exch 2 index exch search
  {
    exch pop
    exch dup () eq
  }
```

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```
                pop exch concatstring
            }
            {
                3 -1 roll
                exch concatstring
                concatstring
            } ifelse
            exch pop true
        }
        {
            pop pop false
        } ifelse
    } def
/concatstring {
    1 index length 1 index length
    1 index add
    string
    dup 0 5 index putinterval
    dup 2 index 4 index putinterval
    4 1 roll pop pop pop
} def
%
/TZ
{
    dup type /arraytype eq
    {
        /_wv exch def
    }
    {
        /_wv 0 def
    } ifelse
    /_useNativeEncoding exch def
    2 index havefont
    {
        3 index
        255 string
        cvs

        dup
        (_Symbol_)
        eq
        {
            pop
            2 index
            findfont

        }
        {
            1 index 0 eq
            {
                dup length 1 sub
                1 exch
                getinterval

                cvn
                findfont
            }
            {
                pop 2 index findfont
            } ifelse
        } ifelse
    }
    {
        dup 1 eq
        {
            2 index 64 string cvs
            dup (-90pv-RKSJ-) (-83pv-RKSJ-) subststring
            {
                exch pop dup havefont
                {
                    findfont false
                }
            }
        }
    }
}
```

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```
        {
            pop true
        } ifelse
    }
    {
        pop dup
        (-90ms-RKSJ-) (-Ext-RKSJ-) subststring
        {
            exch pop dup havefont
            {
                findfont false
            }
            {
                pop true
            } ifelse
        }
    }
    {
        pop pop true
    } ifelse
} ifelse
{
    1 index 1 eq
    {
        /Ryumin-Light-Ext-RKSJ-V havefont
        {/Ryumin-Light-Ext-RKSJ-V}
        {/Courier}
        ifelse
    }
    {
        /Ryumin-Light-83pv-RKSJ-H havefont
        {/Ryumin-Light-83pv-RKSJ-H}
        {/Courier}
        ifelse
    } ifelse
    findfont
    [1 0 0.5 1 0 0] makefont
} if
}
{
    /Courier findfont
} ifelse
} ifelse
_wv type /arraytype eq
{
    _wv makeblendedfont
} if
dup length 10 add dict
begin
mark exch
{
    1 index /FID ne
    {
        def
    } if
    cleartomark mark
} forall
pop
/FontScript exch def
/FontDirection exch def
/FontRequest exch def
/FontName exch def
counttomark 0 eq
{
    1 _useNativeEncoding eq
    {
        /Encoding _nativeEncoding def
    } if
    cleartomark
}
{
    /Encoding load 256 array copy
    modifyEncoding /Encoding exch def
}
```

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```
    } ifelse
    FontName currentdict
end
definefont pop
} def
/tr
{
    _ax _ay 3 2 roll
} def
/trj
{
    _cx _cy _sp _ax _ay 6 5 roll
} def
/a0
{
    /Tx
    {
        dup
        currentpoint 3 2 roll
        tr _psf
        newpath moveto
        tr _ctm _pss
    } ddef
    /Tj
    {
        dup
        currentpoint 3 2 roll
        trj _pjsf
        newpath moveto
        trj _ctm _pjss
    } ddef
} def
/a1
{
W B
} def
/e0
```

=====>>> Then, to save space, we skip to page 136 where the text strings, such as the word “Photon” are defined. For each text string, the (X, Y) coordinate of the starting point, the type font, and font size is given. You can match these strings up with the printed page.

The larger blocks of numbers define graphics such as lines and circles.

```
f
0 To
1 0 0 1 398.8359 708.1401 0 Tp
0 Tv
TP
0 Tr
0 0 0 1 k
/_Helvetica 18.3526 17.0863 -4.1292 Tf
114.0882 100 Tz
(Photon) Tx 1 0 Tk          <<<<=====
(\r) TX
TO
0 To
1 0 0 1 485.0859 591.1401 0 Tp
0 Tv
TP
0 Tr
(Electron) Tx 1 0 Tk
(\r) TX
TO
1 Ap
464.1475 597.75 m
464.1475 594.3247 460.9805 591.5493 457.0723 591.5493 c
```

Expected Useable Lifetime of Different Electronic Document Formats

453.167 591.5493 449.999 594.3247 449.999 597.75 c
449.999 601.1733 453.167 603.9497 457.0723 603.9497 c
460.9805 603.9497 464.1475 601.1733 464.1475 597.75 c
f
436.6592 695.5898 m
436.6592 692.1655 433.4932 689.3896 429.5859 689.3896 c
425.6797 689.3896 422.5127 692.1655 422.5127 695.5898 c
422.5127 699.0142 425.6797 701.7905 429.5859 701.7905 c
433.4932 701.7905 436.6592 699.0142 436.6592 695.5898 c
f
0 To
1 0 0 1 92.1323 541.9849 0 Tp
0 Tv
TP
0 Tr
(P) Tx 1 40 Tk
(aper) Tx 1 0 Tk
(\r) TX
TO
0 To
1 0 0 1 267.2729 646.1987 0 Tp
0 Tv
TP
0 Tr
(Lens) Tx 1 0 Tk
(\r) TX
TO
0 To
1 0 0 1 146.5229 698.6987 0 Tp
0 Tv
TP
0 Tr
/_Helvetica 19.2467 17.9187 -4.3303 Tf
108.7885 100 Tz
(CCD) Tx 1 0 Tk
(\r) TX
TO
0 To
1 0 0 1 61.4785 618.4546 0 Tp
0 Tv
TP
0 Tr
/_Helvetica 18.3526 17.0863 -4.1292 Tf
114.0882 100 Tz
(Light) Tx 1 0 Tk
(\r) TX
TO
0 Ap
79.2236 661.4761 m
F
0 R
0 0 0 1 K
79.2236 655.6567 m
90.7041 655.6567 l
B
90.7041 637.3276 m
79.2236 637.3276 l
B
79.2705 645 m
90.75 645 l
B
79.2236 650.4482 m
90.7041 650.4482 90.7041 650.4482 y
B
79.2236 640.8896 m
90.7041 640.8896 l
B
100.6689 696.0342 m
105.8115 704.3613 l
B
106.5146 685.8643 m
114.5352 691.6323 l

Expected Useable Lifetime of Different Electronic Document Formats

B
85.8857 700.8916 m
89.0991 710.606 l
B
73.6738 700.8916 m
70.46 710.606 l
B
107.7393 674.5234 m
116.5234 674.5234 l
B
100.0269 661.3394 m
103.8833 655.0947 l
B
70.46 660.6455 m
66.6035 653.7065 l
B
61.4609 669.6665 m
53.1055 665.5029 l
B
60.1758 682.8501 m
50.5347 683.5444 l
B
65.3179 692.5649 m
56.9619 700.1978 l
B
180.3711 560.7246 m
241.4326 621.7876 l
B
241.6455 620.1909 m
244.208 624.5845 l
239.9536 622.1626 l
241.6455 620.1909 l
f
2 To
1 0 0 1 -7885 8587 0 Tp
0 Tv
193.2261 557.2554 m
254.2881 618.3179 l
N
TP
0.7071 0.7071 -0.7071 0.7071 193.1387 557.1685 Tm
0 Tr
0 O
0 0 0 1 k
/_Helvetica 9.2519 8.6135 -2.0816 Tf
92.6301 100 Tz
(M) Tx 1 0 Tk
0.7071 0.7071 -0.7071 0.7071 198.2407 562.27 Tm
(o) Tx 1 15 Tk
0.7071 0.7071 -0.7071 0.7071 201.5205 565.5498 Tm
(v) Tx 1 25 Tk
0.7071 0.7071 -0.7071 0.7071 204.3999 568.4292 Tm
(e) Tx 1 0 Tk
0.7071 0.7071 -0.7071 0.7071 207.769 571.7988 Tm
(m) Tx 1 0 Tk
0.7071 0.7071 -0.7071 0.7071 212.8174 576.8467 Tm
(e) Tx 1 0 Tk
0.7071 0.7071 -0.7071 0.7071 216.2349 580.2642 Tm
(n) Tx 1 0 Tk
0.7071 0.7071 -0.7071 0.7071 219.6201 583.6494 Tm
(t) Tx 1 0 Tk
0.7071 0.7071 -0.7071 0.7071 222.9956 587.0249 Tm
(o) Tx 1 0 Tk
0.7071 0.7071 -0.7071 0.7071 226.3594 590.3892 Tm
(f) Tx 1 0 Tk
0.7071 0.7071 -0.7071 0.7071 229.6987 593.7285 Tm
(P) Tx 1 40 Tk
0.7071 0.7071 -0.7071 0.7071 233.4419 597.4717 Tm
(a) Tx 1 0 Tk
0.7071 0.7071 -0.7071 0.7071 236.811 600.8403 Tm
(p) Tx 1 0 Tk
0.7071 0.7071 -0.7071 0.7071 240.1797 604.2095 Tm

Expected Useable Lifetime of Different Electronic Document Formats

(e) Tx 1 0 Tk
0.7071 0.7071 -0.7071 0.7071 243.5483 607.5781 Tm
/_Helvetica 11.1023 10.3362 -2.4979 Tf
(r) Tx 1 0 Tk
/_Helvetica 9.2519 8.6135 -2.0816 Tf
(Movement of Pape) TX
/_Helvetica 11.1023 10.3362 -2.4979 Tf
(r\r) TX
TO
l Ap
231.647 717.1362 m
231.7417 717.3809 231.7915 717.6333 231.7915 717.8921 c
231.7915 720 228.4824 721.7085 224.3994 721.7085 c
220.3174 721.7085 217.0083 720 217.0083 717.8921 c
217.0083 717.7202 217.0303 717.5513 217.0728 717.3853 c
N
0 R
0 0 0 1 K
218.3711 717.6538 m
219.4614 718.0244 220.7515 718.2388 222.1353 718.2388 c
225.2168 718.2388 227.8374 717.1753 228.8062 715.6904 c
S
215.2344 715.2573 m
215.6514 716.2642 216.8032 717.1206 218.3711 717.6538 c
S
0 Ap
0 O
0 0 0 1 k
229.3218 717.2036 m
230.979 712.3296 l
227.2866 715.6567 l
229.3218 717.2036 l
f
l Ap
0 R
0 0 0 1 K
235.0977 718.3477 m
236.188 718.7188 237.479 718.9331 238.8623 718.9331 c
241.9434 718.9331 244.5645 717.8696 245.5327 716.3843 c
S
231.9614 715.9512 m
232.3774 716.958 233.5303 717.8145 235.0977 718.3477 c
S
0 Ap
0 O
0 0 0 1 k
246.0493 717.8975 m
247.7056 713.0239 l
244.0132 716.3506 l
246.0493 717.8975 l
f
l Ap
0 R
0 0 0 1 K
251.9644 718.3477 m
253.0542 718.7188 254.3452 718.9331 255.7285 718.9331 c
258.8101 718.9331 261.4307 717.8696 262.3994 716.3843 c
S
248.8276 715.9512 m
249.2446 716.958 250.3965 717.8145 251.9644 718.3477 c
S
0 Ap
0 O
0 0 0 1 k
262.915 717.8975 m
264.5718 713.0239 l
260.8799 716.3506 l
262.915 717.8975 l
f
l Ap
0 R
0 0 0 1 K

Expected Useable Lifetime of Different Electronic Document Formats

268.6763 718.0112 m
269.7661 718.3828 271.0571 718.5967 272.4399 718.5967 c
275.522 718.5967 278.1426 717.5332 279.1108 716.0479 c
S
265.54 715.6152 m
265.9556 716.6216 267.1089 717.478 268.6763 718.0112 c
S
0 Ap
0 O
0 0 0 1 k
279.6274 717.5615 m
281.2837 712.688 l
277.5923 716.0146 l
279.6274 717.5615 l
f
0 To
1 0 0 1 45 752.25 0 Tp
0 Tv
TP
0 Tr
/_Helvetica 24 22.344 -5.3998 Tf
100 100 Tz
(Digitizing:) Tx 1 50 Tk
() Tx 1 0 Tk
/_Helvetica 14 13.034 -3.1499 Tf
(T) Tx 1 120 Tk
(ur) Tx 1 -25 Tk
(ning Documents) Tx 1 15 Tk
(, the Alphabet, and Music into Ones and Zeros) Tx 1 0 Tk
(\r) TX
TO
2 To
1 0 0 1 -7885 8587 0 Tp
0 Tv
519 284.25 m
519 450 519 450 y
N
TP
0 1 -1 0 519 289.5918 Tm
0 Tr
0 O
0 0 0 1 k
/_Helvetica 24 22.344 -5.3998 Tf
(V) Tx 1 80 Tk
0 1 -1 0 519 303.6807 Tm
(o) Tx 1 0 Tk
0 1 -1 0 519 317.0254 Tm
(l) Tx 1 0 Tk
0 1 -1 0 519 322.3535 Tm
(u) Tx 1 0 Tk
0 1 -1 0 519 335.6953 Tm
(m) Tx 1 0 Tk
0 1 -1 0 519 355.6846 Tm
(e) Tx 1 0 Tk
(Volume\r) TX
TO
u
0 R
0 0 0 1 K
2 w
528.75 275.999 m
527.25 379.6875 l
B
528.6973 378.792 m
527.1738 383.7695 l
525.793 378.7568 l
528.6973 378.792 l
b
U
594 441.0542 m
B
0 To

Expected Useable Lifetime of Different Electronic Document Formats

```
1 0 0 1 466.3359 685.6401 0 Tp
0 Tv
TP
0 Tr
1 w
/_Helvetica 12 11.172 -2.6999 Tf
(Photoconductor) Tx 1 0 Tk
(\r) TX
TO
0 To
1 0 0 1 420.5859 564.8901 0 Tp
0 Tv
TP
0 Tr
(Diode and Capacitor) Tx 1 0 Tk
(\r) TX
TO
2 To
1 0 0 1 -7885 8587 0 Tp
0 Tv
138 288.75 m
138 331.5 l
N
TP
0 1 -1 0 138 288.4502 Tm
0 Tr
0 O
0 0 0 1 k
/_Helvetica 9 8.379 -2.0249 Tf
113.0336 100 Tz
(D) Tx 1 0 Tk
0 1 -1 0 138 295.8486 Tm
(y) Tx 1 0 Tk
0 1 -1 0 138 300.9355 Tm
(n) Tx 1 0 Tk
0 1 -1 0 138 306.5928 Tm
(a) Tx 1 0 Tk
0 1 -1 0 138 312.168 Tm
(m) Tx 1 0 Tk
0 1 -1 0 138 320.6416 Tm
(i) Tx 1 0 Tk
0 1 -1 0 138 322.8975 Tm
(c) Tx 1 0 Tk
(Dynamic) TX
/_Helvetica 10 9.31 -2.2499 Tf
(\rT\rThreshold\r) TX
TO
2 To
1 0 0 1 -7885 8587 0 Tp
0 Tv
150 285.75 m
150 332.25 l
N
TP
0 1 -1 0 150 285.5156 Tm
0 Tr
0 O
0 0 0 1 k
/_Helvetica 9 8.379 -2.0249 Tf
(T) Tx 1 0 Tk
0 1 -1 0 150 291.8066 Tm
(h) Tx 1 0 Tk
0 1 -1 0 150 297.4648 Tm
(r) Tx 1 0 Tk
0 1 -1 0 150 300.8516 Tm
(e) Tx 1 0 Tk
0 1 -1 0 150 306.5967 Tm
(s) Tx 1 0 Tk
0 1 -1 0 150 311.6367 Tm
(h) Tx 1 0 Tk
0 1 -1 0 150 317.292 Tm
(o) Tx 1 0 Tk
```

Expected Useable Lifetime of Different Electronic Document Formats

0 1 -1 0 150 322.9473 Tm
(l) Tx 1 0 Tk
0 1 -1 0 150 325.1943 Tm
/_Helvetica 10 9.31 -2.2499 Tf
(d) Tx 1 0 Tk
/_Helvetica 9 8.379 -2.0249 Tf
(Threshold) TX
/_Helvetica 10 9.31 -2.2499 Tf
(d\r) TX
TO
1 To
1 0 0 1 151.7729 692.6987 0 Tp
0 Tv
1 Ap
0 R
0 0 0 1 K
2 w
257.5229 681.4487 m
193.0229 681.4487 L
151.7729 681.4487 L
190.7729 692.6987 L
296.5229 692.6987 L
257.5229 681.4487 L
S
TP
24.9237 -8.25 Td
2 Tr
0 O
0 0 0 1 k
1 w
/_Helvetica 9 8.379 -2.0249 Tf
(\r) Tx 1 0 Tk
TO
0 To
1 0 0 1 312.2734 697.9487 0 Tp
0 Tv
TP
0 Tr
(\r) Tx 1 0 Tk
TO
0 Ap
0 R
0 0 0 1 K
2 w
502.5 468 m
S
0 O
0 0 0 1 k
1 w
205.0229 682.9487 m
B
0 To
1 0 0 1 478.8232 533.9995 0 Tp
0 Tv
TP
0 Tr
(\r) Tx 1 0 Tk
TO
0 To
1 0 0 1 300.2729 716.6987 0 Tp
0 Tv
TP
0 Tr
/_Helvetica 12 11.172 -2.6999 Tf
(Red\r) Tx 1 0 Tk
0 -14.5 Td
(Green\r) Tx 1 0 Tk
0 -14.5 Td
(or Blue\r) Tx 1 0 Tk
0 -14.5 Td
(\ (RGB\)) Filter) Tx 1 0 Tk
(\r) TX

Expected Useable Lifetime of Different Electronic Document Formats

```
TO
0 R
0 0 0 1 K
336.75 81.75 m
292.25 81.75 l
B
292.5 81.5 m
292.5 77.8184 l
B
291.0654 79.4404 m
292.5176 70.5703 l
293.9702 79.4404 l
291.0654 79.4404 l
f
0 To
1 0 0 1 339.75 78 0 Tp
0 Tv
TP
0 Tr
( \(\RGB\) 24 Bit Color = 3 x 8 Bits per Color) Tx 1 0 Tk
(\r) TX
TO
0 To
1 0 0 1 145.7729 724.9487 0 Tp
0 Tv
TP
0 Tr
(Charge Coupled De) Tx 1 30 Tk
(vice) Tx 1 0 Tk
(\r) TX
TO
0 To
1 0 0 1 81.75 22.5 0 Tp
0 Tv
TP
0 Tr
/_Helvetica 10 9.31 -2.2499 Tf
(F) Tx 1 30 Tk
(or more inf) Tx 1 30 Tk
(or) Tx 1 -25 Tk
(mation see:) Tx 1 50 Tk
( http://www) Tx 1 60 Tk
(.Archiv) Tx 1 25 Tk
(eBuilders) Tx 1 15 Tk
(.com +1 \(\310\) 937-7000 ) Tx 1 0 Tk
/_Helvetica 8 7.448 -1.7999 Tf
(22021v023) Tx 1 0 Tk
(\r) TX
TO
0 R
0 0 0 1 K
592.5 743.25 m
19.0542 743.2505 l
```

=====>>> Then, on page 142 the end of the program is identified.

```
S
LB
%AI5_EndLayer--
%%PageTrailer
gsave annotatepage grestore showpage
%%Trailer
Adobe_Illustrator_AI5 /terminate get exec
Adobe_shading_AI8 /terminate get exec
Adobe_ColorImage_AI6 /terminate get exec
AGM_Gradient /terminate get exec
Adobe_typography_AI5 /terminate get exec
Adobe_cshow /terminate get exec
Adobe_level2_AI5 /terminate get exec
%%EOF
```

Expected Useable Lifetime of Different Electronic Document Formats

This is the vector/text document image defined by the preceding page EPS description file.

