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How to use the

FrameMaker Templates

to write up the

User Requirements

for your project according to the

ESA PSS-05 Software Engineering Standards

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Abstract

This document describes the use of the FrameMaker template for the preparation of documents that conform to User Requirement Document as defined by the Software Engineering Standards (PSS-05) [1] of the European Space Agency (ESA).

The FrameMaker template not only provides a functional and pleasing layout on paper, but can also be automatically converted to WWW and connected via hypertext to other documents of the software project. For convenience, an ASCII version of the template is provided and is meant to be used as a simple way to collect pieces of document content from various, possibly distributed, authors.

Document Status Sheet

This document derives from a previous draft of a User Manual that was written for a pre-release of the URD template.

Table 1 Document Status Sheet

1. Document title: PSS-05 Templates User Manual			
2. Document Reference Number: PSS-05 Templates UM			
3. Issue	4. Revision	5. Date	6. Reason for change
Draft	0	21 November 1995	First draft
Draft	1	4 December 1995	Implement changes resulting from the review of the document by Bertrand Rousseau.
Draft	2	25 June 1996	Update manual to reflect changes in release version 1 of the CERN PSS-05 URD Template.
2	0	30 June 1998	Mnaual revision and update to reflect changes in release version 2 of the CERN PSS-05 URD Template.



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1 Introduction

1.1 Intended readership

This manual is intended to be read by writers wishing to use the FrameMaker template developed in the Information, Process and Technology Group, IT Division, CERN, for the preparation of PSS-05 conformant User Requirements Document (URD).

It is assumed that authors are familiar with the basic features of FrameMaker. These include the Paragraph Catalog and paragraph formats, the Character Catalog and character formats, Cross-reference formats, Anchored Frames, Tables, Body Pages, Master Pages and multi-file books.

This manual does NOT replace the description of PSS-05 *Software Engineering Standards* [1] or the corresponding *Software Engineering Guides* [2].

1.2 Purpose and applicability of the document

The purpose of this document is to provide a user and reference documentation of the CERN PSS-05 URD Template release version 2 that contains FrameMaker template files for the User Requirements Document.

1.3 Purpose of the URD template

The goal of the FrameMaker templates is to aid in the application of PSS-05 by easing the production of the User Requirement Document.

The purpose is essentially the following:

1. To facilitate the production and maintenance of well formatted printed versions of the URD. This implies:
 - a. Support of all the requirements of PSS-05 for the URD.
 - b. Comprehensive formatting functionality for the production of technical documentation.
2. To be able to be automatically convert URDs to WWW as individual webs.

1.4 How to use this document

This manual documents the use of the The CERN PSS-05 URD Template but is organised such that documentation for other templates can easily be incorporated into this guide. In other words, formats are documented by category as opposed to by document type. In this way format categories may be reused in other PSS-05 documents without requiring additional documentation.

For:	See:
Information about this document	Document Status Sheet and Section 1, "Introduction"
General philosophy and structure	Section 2, "Overview of the Template"
Quick start	Section 3, "Getting Started with the FrameMaker URD Template"
How to install for first time	Section 3.2, "To install the CERN PSS-05 URD Template"
Reference for general formats	Section 5, "General Formats"
How to tag URs	Section 7.2, "Formats for User Requirements"
Details on front page	Section 6, "Formats Specific to the Front Matter File"
Details on preliminary material	Section 6, "Formats Specific to the Front Matter File"
Details on main content file	Section 7, "Formats Specific to the Main Body File"
Details on appendices file	Section 8, "Formats Specific to the Appendices File"
Maintenance guidelines	Appendix A, "Maintenance Guidelines"
Reference of generated files	Appendix B, "The Automatically Generated Files"
Quick reference of paragraph formats	Appendix C, "FrameMaker Paragraph Formats Quick Reference"

Figure 1 How to use this document

1.5 Conventions in this manual

Format tag names are displayed in italics

e.g. the tag name of this paragraph format is *DL1 Description*. When the surrounding text is already italicised, *the tag names are formatted in bold*.

“all files”

Unless otherwise implied by the context, this means “all files that are intended to be edited by the author”, i.e. NOT the automatically generated files.

Examples of how paragraph formats appear in the template

All such examples are enclosed within a box. The width of the box represents the width of the text area in the template itself.

1.6 Problem reporting

Send electronic mail to docsys@ptsun00.cern.ch specifying:

- your name,
- a brief description of the problem,
- the versions of the template, FrameMaker, and other tools used,
- and a description of the environment.

1.7 References

- 1 *Software Engineering Standards*, C.Mazza, J.Fairclough, B.Melton, D. de Pablo, A.Scheffer, R.Stevens, Prentice Hall, ISBN 0-13-106568-8, 1994. These are the PSS-05 standards defined by ESA Board for Software Standardisation and Control, BSSC.
- 2 *Software Engineering Guides*, C.Mazza, J.Fairclough, B.Melton, D. de Pablo, A.Scheffer, R.Stevens, M.Jones, G.Alvisi, Prentice Hall, ISBN 0-13-449281-1, 1996.
- 3 *FrameMaker Reference*, Frame Technology International Ltd.
Included with the FrameMaker publishing software.
- 4 *Software Development Tools*, CERN/IPT service.
Documented on the WWW at the URL:
<http://www.cern.ch/PTTOOL/>



2 Overview of the Template

The template is intended to be used to help in the preparation of UR documents using FrameMaker. Contained in the template are the predefined sections as specified by PSS-05, as well as a comprehensive set of predefined formats, from which both a high quality printed version and a WWW version may be automatically derived. An ASCII version of the template is also included for convenience.

2.1 Usage of the template

The template may be used in various ways:

1. As simple ASCII 'fill-out forms', thus facilitating distributed authorship.
2. For preparing high quality printed documents, using the FrameMaker template. In distributed authorship an editor(s) would be assigned the task of collecting the material and maintaining the FrameMaker files.
3. As an easy way to produce an online WWW version.

2.2 Required external software

- FrameMaker version 5.5.

2.3 Features of the FrameMaker template

A FrameMaker book file structure

This allows the automatic production of lists such as Table of Contents, List of Figures, List of Tables. An added advantage to a book structure is that the predefined formats may be separated according to the context, making the template easier to use.

Universally conformant file naming

Chosen filenames work on all operating systems, including MS-DOS.

The predefined sections

The template contains all the PSS-05 predefined sections, according to the type of document (URD).

Instructions to fill out

The template contains some instructions on how the template should be completed. However, these should never replace the PSS-05 specification [1] and guides [2] themselves. These instructions use the FrameMaker conditional text feature and therefore may be made visible or invisible at any time (see Section 3.5).

Comprehensive set of predefined formats

All formats needed for producing the URD are provided.

Manual assignment of identifiers for requirements

The automatic numbering facilities of FrameMaker is not used because the author must have complete control on the assignment of identifiers, and these identifiers may not be reused or changed.

Change management

Predefined character and paragraph formats are provided to help the management of changes, if needed.

Grouping of paragraph formats

Format tag names are chosen such that formats that are similar or related are grouped together when displayed in the paragraph catalog.

Different formats always have different tag names

This improves maintainability and removes the need for format overrides. For example, headings in the appendices are tagged differently from headings in the rest of the document, as these are numbered differently.

Each book component file contains only those formats that *may* be used within it

This makes it easier for the editor to select the appropriate formats, thus improving the usability of the template. Thus, in the URD template, the file for the front matter does not contain the formats that should be used for tagging user requirements.

Page size

The template is based on A4 page sizes.

2.4 The distribution file

The contents of the distribution file for the template is shown in Figure 2.

PSS05Tv02/	The top level directory of the tar file
README	This file
COPYRIGHT	Copyright statement
HISTORY	History of changes
manual/TUM.pdf	The Template User Manual, in PDF
URD_Instance.tar	Tar file containing the URD subdirectory
URD/	
README	For the URD template
URD.bk	The FrameMaker template files for the URD
URD_pre.fm	
URD_TOC.fm	
URD_LOF.fm	
URD_LOT.fm	
URD_body.fm	
URD_LOR.fm	
URD_app.fm	

URD.pdf	The printable PDF format of the URD template
html/URD.html	Entry point of generated WWW version
ascii/URD.txt	The ASCII version of the URD template
miscellaneous/ URD-Master.css	Cascading Cascading Style Sheet file to replace the one generated by FrameMaker, on saving a URD to HTML.

Figure 2 The file structure of the distribution kit.

2.5 The filename suffixes of the book component files

The document template is constructed as a FrameMaker book. The book is made up of a number of files, some of which are meant to be edited by the user, and some are not as they are automatically generated. Within the template book, each file may be identified by its filename suffix. Figure 3 lists the suffixes used for user editable files and Figure 4 lists the suffixes used for the automatically generated files.

<i>pre</i>	Front matter file
<i>body</i>	Main content body
<i>app</i>	The appendices

Figure 3 Filename suffixes of user editable files.

<i>TOC</i>	Table of Contents
<i>LOF</i>	List of Figures
<i>LOT</i>	List of Tables
<i>LOR</i>	List of Requirements

Figure 4 Filename suffixes of automatically generated files

3 Getting Started with the FrameMaker URD Template

3.1 Before you start...

If you are already working on a URD...

You may want to update your document in progress to the new version of the template. See Appendix A.1, "Updating formats from a newer version of the template").

If you have access to a central installation of CERN PSS-05 URD Template...

You do not need to install if you have access to a central installation of the CERN PSS-05 URD Template, such as the one under the */pttools/* directory which is maintained by the Software Developments Tools Service [4]. In this case you only need to pick up the component template tar file (*URD_Instance.tar*) for the document that you wish to edit, as explained in Section 3.3, "To create individual User Requirement Documents". For more information see also the *README* files contained in the distribution file.

3.2 To install the CERN PSS-05 URD Template

Unpack the distribution file *PSS05Tv2.tar* in an appropriate location, i.e. in a place that is easily accessible by all intended users. This is done by executing (on UNIX) the command:

```
tar -xvf PSS05Tv2.tar
```

This will create the directory tree shown in Figure 2, starting from the current directory.

3.3 To create individual User Requirement Documents

Copy the component URD template tar file for the individual document that you wish to edit to a location where you can comfortably work on it, e.g. in the top level directory of the project for which you wish to prepare a PSS-05 document.

To prepare a URD you will need to:

1. Copy the file *URD_Instance.tar* to your work area.
2. Untar it in the same way as in Section 3.2, "To install the CERN PSS-05 URD Template". (The contents of template tar file are shown in Figure 2.)

If you are using the installation of the template to be found under */pttools/* then you can proceed to edit the document as explained in Section 3.4, "Editing the FrameMaker book".

3.4 Editing the FrameMaker book

1. Launch FrameMaker.
2. Open the book file for the document you wish to edit, i.e. to edit the URD open the file URD .bk.

A book window, similar to the ones shown in Figure 5, will appear. The files contained in the book are displayed in the book window, and they can be opened individually by double-clicking on them.

The FrameMaker book template contains some automatically generated files, which are indicated by the '+' file extension suffix in the FrameMaker book window. These files should never be edited manually. Thus only the front matter file, the main body file, and the appendices may be edited.

Always access the component files through the book file itself

I.e. To open a component file do not use *File Open...* but just double click on the filename in the book window. This way you will always have a consistent view and quick access to the entire document. Also, updating the book may only be done from the book *File* menu, as explained in Appendix A.2, "Updating (cross-references, numbering) and printing a book".

Navigate around the book by clicking in the Table of Contents

The TOC file contains FrameMaker hypertext links for each entry. To navigate around the book you can just click on the TOC entry for the desired section and FrameMaker will pop up the right file at the right place.

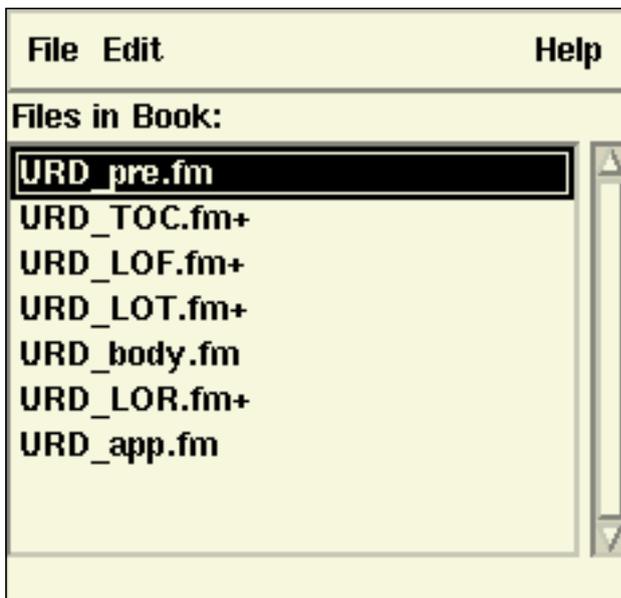


Figure 5 The window for the FrameMaker book file of the URD template.

The URD template has a FrameMaker book structure and the component files are listed in Figure 6.

<i>URD.bk</i>	The book file itself, defining only the organisation of the contained files
<i>URD_pre.fm</i>	The preliminary material (title page, abstract, ...) of the document
<i>URD_TOC.fm</i>	Automatically generated full table of contents
<i>URD_LOF.fm</i>	Automatically generated list of figures
<i>URD_LOT.fm</i>	Automatically generated list of tables
<i>URD_body.fm</i>	The main body of material of the document
<i>URD_LOR.fm</i>	Automatically generated list of all User Requirements, for quick reference
<i>URD_app.fm</i>	The appendices

Figure 6 The files of the URD FrameMaker book.

3.5 Instructions contained in the template itself

The template contains some instructions on how the template should be completed. These instructions are tagged with the *PSS05 Guide* FrameMaker conditional tag and may therefore be made visible or invisible at any time.

Switching visibility for all files in the book is done in two steps, first by setting visibility of the *PSS05 Guide* FrameMaker conditional tag for one of the book components, e.g. *URD_body.fm*, and then by importing the conditional text settings from this file to all other files in the book:

a. **Setting conditional settings for a single component file**

Activate the component document, e.g. *URD_body.fm*, and pop up the *Show/Hide Conditional Text* window. This can be done by either selecting *Conditional Text...* from *Special* menu and then clicking on *Show/Hide...* or by just typing the keyboard shortcut, `ESC V C`.

You will then just need to move the *PSS05 Guide* conditional tag under *Show* or under *Hide*, as necessary, and click on *Set*.

b. **Updating the book to use the conditional settings of a component file**

1. From the *File* menu of the book file window, select *Import Formats...*
2. Under *Import from Document*: select the file in which you have just modified the conditional text settings.
3. Under *Import and Update*: make sure you select only *Condition Text Settings* (you will probably need to deselect all others...).
4. Under *Update*: make sure that all book component files are included.
5. Click on *Import*.

Please keep in mind that the provided instructions should never replace the PSS-05 specification [1] and guides [2] themselves.

3.6 Filling in the title page

The title page is contained the file *URD_pre.fm*.

There are several paragraph formats, with tag names such as “*Document: ...*” that should be used *only* once and *only* on the title page. Each of these behaves like a document information field, e.g. the document reference number, document author, etc. The title page template already contains an instance of each of these paragraph types, each containing the corresponding variable definition. A description for each of these paragraphs is provided in Section 6.2, “Paragraph formats for the front page”.

For each one of the “*Document: ...*” paragraph tags in the *URD_pre.fm* file, as mentioned above, there is a corresponding user variable definition which is contained in all component files of the book. These variables are used for the running headers and footers on document pages.

To edit , just double-click on the variable text and edit the definition.

3.7 Setting the running headers and footers

The running header on all pages is set according to the value of some of the variables used on the front page. These are:

- *Document: Project Name*
- *Document: Project Name Qualification*
- *Document: Type*
- *Document: Creation Date*
- *Document: Issue*
- *Document: Revision Number*

The running footer is set by modifying the value of one variable:

- *Document: Status*

To set the running headers and footers in all files in the book, you need to:

1. first edit the definition of the above variables in one of the files, e.g. in *URD_pre.fm*.
2. From the *File* menu of the book file window, select *Import Formats...*
3. Under *Import from Document:* select the file in which you have just redefined the variable definitions.
4. Under *Import and Update:* make sure you select **only** *Variable Definitions* (you will probably need to deselect all others...).
5. Under *Update:* make sure that all book component files are included.
6. Click on *Import*.

3.8 Filling in other front matter information

To edit, first open the file *URD_pre.fm*. Other than the title page, the front matter information consists of the following sections:

- The Abstract
- The Document Status Sheet
- The Document Change Record

You will need to modify each of these sections, which are already contained in the template. For more details on how to fill each one see Section 6.4, "The Abstract, Document Status and Change Record sections".

You may also add other sections to the front matter as necessary. For this purpose a full set of non-numbered headings and all general purpose paragraph formats are also included in the front matter file. For a full description of the formats that are special to the front matter file see Section 6, "Formats Specific to the Front Matter File".

3.9 Filling in the content body

The content body file is *URD_body.fm*. How the content of the URD should be organised is specified in the PSS-05 standards themselves. Therefore, the main headings are already provided in the template according to this specification. You will simply need to fill out the contents of each of the subsections. New sections not described by the specification may be added as needed.

General text formatting, such as how to tag headings, lists, figures, and so on, is described in detail in Section 5, "General Formats".

User Requirements are formatted using dedicated styles. These are described in Section 7.2, "Formats for User Requirements".

3.10 Filling in the appendices

The main difference between the file for the appendices (*URD_app.fm*) and the one containing the main content body is paragraph numbering. Namely, headings, figure captions, table captions and equations are numbered differently in the appendices. Each of these paragraph types are described in:

- Section 8.1, "Headings in the appendices".
- Section 8.2, "Figure captions in the appendices".
- Section 8.3, "Table titles in the appendices".
- Section 8.4, "Equations in the appendices".

3.11 Using the ASCII template

For convenience, an ASCII template is provided for the URD. It is meant to be used as a simple way to collect pieces of document content from various, possibly distributed, authors. The bits and pieces must then be passed to an editor who will compile the FrameMaker version of the document.

4 Warnings!

The CERN PSS-05 URD Template is designed to make good use the powerful features of FrameMaker, which however has its own set of shortcomings which we have to live with. Heeding these warnings may save you time and grief!

Do not change filenames

Inter-file cross-references (for page header information) will be unresolved. Changing filenames is possible but more complicated than one may think. A safe way to do so is outlined in Appendix A.5, "Changing the template filenames".

The name of the book file itself may be changed freely without any problems.

Do not change paragraph format tag names

Paragraph format tags are used in the definition of other FrameMaker formats (such as variables and paragraph formats) and generated files. Changing tag names may make the FrameMaker template malfunction.

Also, the automatic conversion to WWW will break.

Do not modify predefined formats

This may introduce inconsistencies with other predefined formats in the template, and the automatic conversion to WWW may produce incorrect results.

Maintenance may also become an issue, as the changes you make may be lost when the document is automatically updated to conform to a future release of the template.

Careful with *File Import Formats...*

If formats *must* be updated from another document, update only from equivalent files, e.g. use the formats in the file *URD_pre.fm* of the reference template to update *URD_pre.fm*, etc.

Never delete cross-reference markers

This will generate unresolved cross-references in the book. When replacing text, turn on *View / Text Symbols* to make these markers visible.

If new formats must be added...

It is a good idea to adopt a special naming scheme for all newly created tags, e.g. to prefix all tag names you create with your project name, or your initials. This will help you to understand your document formats later during a document revision.

For each newly created paragraph and character format, a corresponding configuration rule for the conversion to WWW must be also added.

Remedies for possible problems are provided in Appendix A, "Maintenance Guidelines".

If, after reading these warnings, you still need to modify the template in an inadvisable way, then let us know (see Section 1.6, "Problem reporting") and we may be able to give more detailed advice or even change the template to incorporate the changes that you need.



5 General Formats

All user editable files contain a comprehensive set of general formatting building blocks. These predefined formats are in general consistent across all these files. However, there are differences in some cases, dictated by the context. For example, the formats for section headings are different in the front matter file, the main content body file, and the appendices file, as different numbering schemes are required for the three cases.

5.1 Paragraph formats for section headings

There are six paragraph formats to indicate six levels of section headings. Heading formats are different from one file to another. Thus:

In the front matter file:

Headings are not numbered. See Section 6, "Formats Specific to the Front Matter File".

In the main body file:

Headings are numbered using arabic numerals. See Section 7, "Formats Specific to the Main Body File".

In the appendices file:

Headings are numbered alphabetically. See Section 8, "Formats Specific to the Appendices File".

5.2 Paragraph formats for general purposes

These paragraph formats may be used anywhere except within lists.

- *Body*
- *Body Comment*
- *Body Inset*
- *Body Preformatted*
- *Body Small Note*
- *Body TBD*

An example of each of these, in the same order as listed, is given in Example 1.

In addition to the above, the *Body Placeholder* paragraph format is provided for the formatting of figures and tables. Anchored frames and tables may be put in such a paragraph to position them in the flow of text. The *Body Placeholder* paragraph is not meant to be used for text and, for ease of identification, it is set in blue. For formatting of figures and tables see Section 5.5, "Figures" and Section 5.6, "Tables".

The *KeepRestOfPageClear* paragraph format is provided as a means to force next paragraph to start on a new page, without having to introduce overrides such as page-breaks which will disappear at the next document format update.

The most common of these is the *Body* paragraph style, like this one. In addition to this a few others are supplied:

*This is an emphasised paragraph style, tagged **Body Comment** that is suitable for special remarks or for an introductory note at the beginning of a section.*

Text that is required to be indented from the main body is to be assigned the paragraph style tag *Body Inset*.

```
      000
      00
      0
      II__| [ ] | |   I I
      |_____|_|   I I
      < 00----000 00----00
```

Small notes such as this one may be entered using the *Body Small Note* paragraph style.

TBD Whenever a section of paragraph needs more work or discussion, such a paragraph may be inserted to record the action item directly into the document in progress.

Example 1 Five paragraph formats for various purposes

5.3 Paragraph formats for list items

Lists may be made up of:

- Bulleted items.
- Enumerated items, which may be:
 - Numeric, using arabic numerals.
 - Alphabetic, using lowercase letters.
 - Roman, using lowercase numerals.
- Term-Definition items (or Definition List items), each of which is made of a pair of paragraphs, one for the term followed by one for its description.

Bulleted and enumerated list items may occur at three depth levels, while definition list items may occur at two depth levels. All lists may be intermixed as necessary. Two list item continuation paragraph formats are available for the three list levels.

5.3.1 Bulleted list items

The tag names for bulleted list formats are listed in Example 2.

Entering a carriage return while in a bulleted list item paragraph will create another bulleted list item paragraph of the same level.

- *L1 Bullet list item.*
 - *L2 Bullet list item.*
 - *L3 Bullet list item.*

Example 2 The three levels of bulleted list items.

5.3.2 Enumerated list items

The tag name of the paragraph format for a first item in an enumerated list is different than the rest. Entering a carriage return while in an enumerated list item paragraph, a similar one of the same level with appropriate numbering is created. The tag names for all the enumerated formats are listed in examples 3, 4 and 5.

1. *L1 arabic 1st*
2. *L1 arabic nth*
 1. *L2 arabic 1st*
 2. *L2 arabic nth*
 1. *L3 arabic 1st*
 2. *L3 arabic nth*

Example 3 The three levels of enumerated list items using arabic numerals.

- a. *L1 alphabetic 1st*
- b. *L1 alphabetic nth*
 - a. *L2 alphabetic 1st*
 - b. *L2 alphabetic nth*
 - a. *L3 alphabetic 1st*
 - b. *L3 alphabetic nth*

Example 4 The three levels of alphabetically enumerated list items.

- i. *L1 roman 1st*
- ii. *L1 roman nth*
 - i. *L2 roman 1st*
 - ii. *L2 roman nth*
 - i. *L3 roman 1st*
 - ii. *L3 roman nth*

Example 5 The three levels of enumerated list items using roman numerals.

5.3.3 List item continuation paragraphs

A general purpose continuation paragraph and a fixed width font continuation paragraph are provided for each of the three list levels. These may be combined with all kinds of list, including definition lists. The paragraph tag names are:

- *L1 Continuation* and *L1 Continuation Preformatted*
- *L2 Continuation* and *L2 Continuation Preformatted*
- *L3 Continuation* and *L3 Continuation Preformatted*

Example 6 provides an example for continuation paragraphs for list items at level 1. Lower level continuation paragraph formats are exactly the same except they are indented according to their level.

1. *L1 arabic 1st ...*
L1 Continuation ...
2. *L1 arabic nth ...*
L1 Continuation Preformatted ...
3. *L1 arabic nth*

Example 6 Continuation paragraphs for list items at level 1.

5.3.3.1 Mixing numbering schemes

A different numbering scheme may be used at each depth level of a list. An example is shown in Example 7.

1. *L1 arabic 1st*
2. *L1 arabic nth*
 - a. *L2 alphabetic 1st*
 - i. *L3 roman 1st*
 - ii. *L3 roman nth*
 - b. *L2 alphabetic nth*
3. *L1 arabic nth*

Example 7 Mixing numbering schemes.

5.3.4 Definition lists

Paragraph pairs for each definition list item may occur at two depth levels. The term is displayed in bold and may be formatted in two ways:

1. As normal, i.e. the subsequent description paragraph forces a line break. The tag names for these formats are:
 - a. *DL1 Term*
 - b. *DL2 Term*
2. As a run-in head, i.e. the subsequent description paragraph does not force a line break. The tag names for these formats are:
 - a. *DL1 Term RIH*
 - b. *DL2 Term RIH*

The description paragraph tag names are:

- *DL1 Description*
- *DL2 Description*

List item continuation paragraphs or other lower level lists may be combined as needed in the description of a term. Some constraints apply and these are specified in Section 5.3.5.

Definitions, acronyms, abbreviations and glossaries should be formatted using the paragraph formats described here. The two different styles are illustrated in Example 8 and Example 9.

Event

An initial set of particle types, vertices, momenta and times.

Event parallelism

To process multiple events in parallel by multiple processors.

Example 8 Definition list items using the normal style for the term.

PSS Procedures, Specifications and Standards

URD User Requirements Document

UR/R User Requirements Review

Example 9 Definition list items using the run-in head style for the term.

5.3.5 Combining definition lists with other lists

This may be done as required. The only constraints are:

Any *DLn ...* paragraph may be followed by any of:

- *Ln ...* continuation paragraph (See Example 10).
- *Ln+1 ...* enumerated or bulleted paragraph (See Example 11).

Any L_n ... paragraph may be followed by any:

- DL_{n+1} Term ... paragraph (See Example 12).

Example 10 and Example 11 help to illustrate this.

PSS Procedures, Specifications and Standards

Software Engineering Standards developed at the European Space Agency, requiring the production of several documents amongst which are the following:

URD User Requirements Document

SPMP Software Project Management Plan

Example 10 Using an $L1$ Continuation paragraph after a $DL1$ Description paragraph.

Photon

1. Compton collision
2. Rayleigh effect

Electron and Positron

1. Multiple scattering

Example 11 Using $L2$ arabic ... after pairs of $DL1$ Term RIH and blank $DL1$ Description paragraphs.

a. **Functional requirements**

Purpose To specify 'what' the software has to do.

Source The logical model.

b. **Performance requirements**

Purpose To numerically specify values for measurable variables.

c. ...

Example 12 Using $DL2$ Term ... paragraphs after $L1$ alphabetic ... paragraphs.

5.4 References and footnotes

Footnotes may be inserted in any paragraph. A paragraph with the *Footnote* tag name is created automatically. The paragraph tag name for a reference autonumbered paragraph is *Reference List*.

A footnote may be inserted in any paragraph¹.

...

5 *Guide to the user requirements definition phase, ESA PSS-05-03*, ESA Board for Software Standardisation and Control (BSSC), 1991.

6 Reference entries are tagged with the *Reference List* autonumbered paragraph style.

...

1. A footnote.

Example 13 Reference paragraphs and footnotes.

5.5 Figures

There are two ways recommended ways to insert a figure.

A first way involves the creation of two paragraphs, *Body Placeholder* and *Figure Caption*. The *Body Placeholder* paragraph format is only a container for an anchored frame (or a table), which you will create and insert to hold the picture.

A second way to insert a figure is to place the cursor at the desired location and, from the *Table* menu, insert a table using the predefined *Figure* table format. This creates a single-column, two-row table and places the cursor in the top cell, where an anchored frame may be inserted. Example 28 shows a sample figure with its caption.

In the front matter and main body files a paragraph with the format tag of *Figure Caption* is automatically created in the lower cell of the table. **In the appendices file** a paragraph with the format tag of *Figure Caption Appendix* is automatically created in the lower cell of the table. See Section 8, "Formats Specific to the Appendices File".

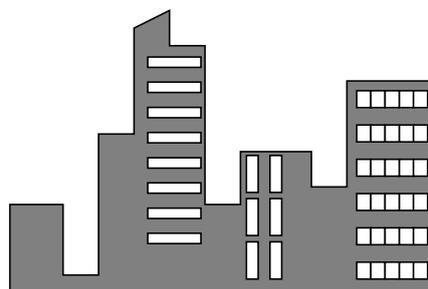


Figure 7 The figure caption

Example 14 One of two ways to format figures is to use the *Figure* table format.

The advantage of the *Body Placeholder/Figure Caption* paragraphs method over the *Figure* table method is better control over the conversion to WWW but one loses the possibility to float the figure and the caption, as one unit, around the page. An anchored frame with ideal width (15.3 cm), aligned right and positioned below current line, is provided in the *Miscellaneous Reference Page*, and may be used in both cases.

A special table format for figures is provided for landscape pages (see Section 5.10.2). This is the table format *Landscape Figure* and the procedure to use it is exactly the same as for using the *Figure* table format on portrait pages, described above.

Hot tip If new figures are created by copying and pasting existing figures then it is important that cross-reference markers are NOT copied along with the figure, as this will confuse FrameMaker. It is a common occurrence that figure caption paragraphs are the destination of a cross-reference.

5.6 Tables

Tables are created by selecting *Insert Table...* from the *Table* menu. A simple general purpose table format, *Basic Table*, is provided in all files. When this format is selected, an empty table similar to the one in Example 15 is created.

Example 15 The table format *Basic Table*.

Tables can be placed (i.e. the location of the table marker) anywhere in the text. You can also encapsulate tables within *Body Placeholder* paragraphs, gaining more control over page breaks and on the conversion to WWW.

Customising the table, such as changing the number of columns, cell straddling, ruling, shading, etc., must be done manually by the author. This is achieved by using the options under the *Table* menu.

Some paragraph formats are provided for use within table cells. Their tag names and use are indicated in Example 16.

Table 21 Special paragraphs for tables (such as this one which is tagged *Table Title*).

<i>Table Cell Heading</i>	For headings within a table.
<i>Table Cell Body</i>	The default style in a table cell. This is left justified.
<i>Table Cell Body Centred</i>	Similar to default <i>Table Cell Body</i> , except that this is centred.
In addition a <i>TableFootnote</i> paragraph is created when a table footnote ^a is inserted.	

a. Such as this.

Example 16 Paragraph formats for use within table cells.

In the front matter and main body files a paragraph with the format tag of *Table Title* is automatically created, as shown in the empty Table 5 of Example 15. **In the appendices file** a paragraph with the format tag of *Table Title Appendix* is automatically created (see Section 8, "Formats Specific to the Appendices File").

5.7 Mathematical formulae

Mathematical equations are inserted by first creating a paragraph using the *Body Equation* paragraph format. This is autonumbered with the number appearing on the right.

From the *Equations* control panel, activate the *Equations* pull-down menu and select *New Medium Equation*. After specifying the equation, select *Shrink-Wrap Equation* from the same menu. To centre an equation, insert a TAB character at the beginning of the paragraph.

$$\tau = 2^7 \left(-b_0 + \sum_{i=1}^7 b_i 2^{-i} \right) \quad (1)$$

Example 17 A numbered mathematical equation.

In the front matter and main body files the paragraph format used is *Body Equation*, and is shown in Example 30. **In the appendices file** the paragraph format used is *Body Equation Appendix*. See Section 8, "Formats Specific to the Appendices File".

5.8 Character formats

All the files in the book template contain the same set of character formats.

- | | |
|--|--|
| <ul style="list-style-type: none">• <i>Emphasis</i>• Strong• Code• Σψμβολ (Symbol)• Subscript• Superscript | <ul style="list-style-type: none">• <i>Italic</i>• Bold• AttributeName• <i>Keyword</i>• <u>Changed</u>• Removed |
|--|--|

Example 18 The predefined character formats.

In all cases, applying any of these character highlights changes only what is indicated by the tag name, e.g. applying the character format *Bold* only changes the weight of the characters and not the font size, font family, etc.

5.8.1 Special character formats for change management

Changed When applied to a string, e.g. this phrase has just been added, the string is overlined. This may therefore be used as a completely independent mechanism from change bars to keep track of modifications.

When changes are accumulated during the period between issues of a document, it is a good idea to map these changes into the *Document Change Record* section.

Removed When applied to a string, e.g. ~~this phrase has been removed~~, the string is stricken through. This marks deleted passages as such but still retains them as their physical removal may produce lack of consistency or clarity in the same or related documents.

5.9 Cross reference formats

The action of each cross-reference format is indicated:

Paragraph text

Displays the text of the referenced paragraph.

Paragraph autonumber

Displays the autonumber string of the referenced paragraph.

Paragraph autonumber only

Displays the calculated numeric value only, without any extra characters added in the autonumber string of the referenced paragraph.

Paragraph all

Displays a concatenation of the autonumber string and the text of the referenced paragraph.

Section paratum

Displays the autonumber string of the referenced paragraph, and precedes it with the string "Section ".

Section *paranum*, “*paratext*”

Displays the autonumber string of the referenced paragraph and the paragraph text enclosed in double quotes, and precedes it with the string “Section “.

Appendix *paranum*

Displays the autonumber string of the referenced paragraph, and precedes it with the string “Appendix “.

Appendix *paranum*, “*paratext*”

Displays the autonumber string of the referenced paragraph and the paragraph text enclosed in double quotes, and precedes it with the string “Appendix “.

Page

Displays the page number of the referenced paragraph, and precedes it with the string “page “.

Reference

Only for *Reference List* items, e.g. PSS-05 [1], ...

Requirement

For user and software requirement identifiers, e.g. UR 3-9 ...

Paragraph tag

Displays the paragraph tag name, in italics, of the referenced paragraph.

Filename

Displays the name, in italics, of the FrameMaker file containing the referenced paragraph.

5.10 Master page formats

There are three master page formats common to all files, the *Left* and *Right* portrait master page formats, and one landscape master page with the format name *Landscape*.

5.10.1 The *Left* and *Right* master page formats

The *Left* and *Right* master page formats are the respective default layouts for automatically created pages. The only difference between these pages is the footer, which formats the page number to appear on the outside of the respective page.

5.10.2 The *Landscape* master page format

The *Landscape* master page format is provided for content that does not fit well on a portrait layout. This format must be applied specifically to a page by using the dialogue box obtained by selecting the following menu sequence: *Format / Pages... / Master Page Usage...*

A special table format, *Landscape Figure*, is provided for use on landscape pages. It is contained in the table format catalog and the procedure to use it is exactly the same as that for normal figures, described in Section 5.5.

5.10.3 Special paragraph and variable definitions for the master pages

The *Header* and *LandscapeHeader* paragraph formats occur only on these master pages and they use a special variable. This is the variable *Running H/F 4* and it provides the contents of the current level 1 heading paragraph.

5.11 Reference pages

Other than the reference pages required by FrameMaker (frames for paragraph and footnote formatting, information about automatic file generation) the *Miscellaneous* reference page contains items that may be useful to the editor. In this case it contains an anchored frame with a standard height and width to be copied and pasted when preparing figures.

6 Formats Specific to the Front Matter File

The front matter file is identified by the *pre* filename suffix. It contains the front page, the sections for the Abstract, Document Status Sheet and Document Change Record, and possibly other non-enumerated sections.

6.1 Paragraph formats for front matter section headings

Sections and subsections may be added to the front matter as needed. For this purpose, six heading formats are provided, as in other files except that here they are not numbered. The paragraph tag names are *H1 No Number*, ..., *H6 No Number*, with 1 representing the highest level.

Top level heading (*H1 No Number*)

Second level heading (*H2 No Number*)

Third level heading (*H3 No Number*)

Fourth level heading (*H4 No Number*)

Fifth level heading (*H5 No Number*)

Sixth level heading (*H6 No Number*)

Example 19 Six levels of front matter section headings.

Any section added with these headings will automatically appear in the Table of Contents when this is regenerated.

6.2 Paragraph formats for the front page

The tag names of the paragraph formats for the front page all start with the string "Document: ". The rest of the tag name indicates the use of each format. It is important to note that there may be *only one occurrence* of each of the paragraphs, and that this is already present in the template file. Thus, the only thing required is to edit each one.

The text contained in these paragraphs is used for page headers throughout the document, and because of this each one contains a destination cross-reference marker which *must* not be deleted, as pointed out in Section 4, "Warnings!".

Document: Author

To specify the name(s) of the author(s). The string prior to the first TAB character may be changed as required. To specify more than one author use commas as separators, and tabs and forced line breaks as necessary.

Document: Creation Date

The string "Created on" is part of the format definition.

Document: Institution Name

To specify the name(s) of the institution(s) issuing the document.

Document: Issue

The issue the document. Used as header information on all internal pages.

Document: Last Modified Date

The string "Last modified" is part of the format definition. Used as header information on all internal pages.

Document: Project Name

The name of the project of which the document is a part of. Used as header information on all internal pages.

Document: Project Name Qualification

A qualification of *Document: Project Name*. Used as header information on all internal pages.

Document: Reference

A reference id for the document. Used as header information on all internal pages.

Document: Revision Number

Revision number of the current issue. Used as header on the inside of the title page.

Document: Type

The name that PSS-05 assigns to this kind of document. Used as header information on all internal pages.

6.3 Master page format for the front page

The master page format *Front Page* occurs only in this file and is used only for the front page.

6.4 The Abstract, Document Status and Change Record sections

The following preliminary sections are already contained in the template as PSS-05 requires their inclusion:

- a. Abstract
- b. Document Status Sheet
- c. Document Change Record

The following heading formats are dedicated for this use. This will enable special action to be taken when automatically converting the document.

- *H1 Abstract*
The text of the abstract should be tagged with the *Body Abstract* paragraph format.
- *H1 Status Sheet*
- *H1 Change Record*

The formatting of these heading paragraphs is identical to the top level heading of Example 19.

6.5 Table formats for Document Status and Change Record

The contents of the Document Status Sheet and Document Change Record sections are in fact two tables with a format suggested by the PSS-05 standards. To facilitate their creation, two table formats, *Status Sheet* and *Change Record* have been defined and added to the Table Catalog.

These formats may be accessed by selecting *Insert Table...* from the *Table* menu. As the extent to which a table format in the catalog may be predefined is limited, some manual customisation is necessary after a table has been created in this way. Customisation consists mainly of cell straddling and is achieved by using the options under the *Table* menu.

However, a prepared example of each of these table formats is included in the appropriate section of the template file.

7 Formats Specific to the Main Body File

The file to contain the main body of the document is identified by the filename suffix *body*. In addition to all the formats described in Section 5, "General Formats" there is a full set of numbered headings and another set of paragraph formats for User Requirements and associated attributes.

7.1 Numbered heading formats

There are six levels of heading formats, having tag names *H1* to *H6*, *H1* being the highest. The space above and below the heading is defined as part of the style and the numbering is automatic, as is the space between the numbers and the text of the heading itself. All six levels of headings are automatically followed by a *Body* paragraph, i.e. if the cursor is at the end of the heading paragraph and a carriage return is entered, a *Body* paragraph is created. Headings of level 1 are defined to start at the beginning of a new left page.

9 Top level heading (*H1*)

9.1 Second level heading (*H2*)

9.1.1 Third level heading (*H3*)

9.1.1.1 Fourth level heading (*H4*)

9.1.1.1.1 Fifth level heading (*H5*)

9.1.1.1.1.1 Sixth level heading (*H6*)

Example 20 Six levels of numbered headings.

7.2 Formats for User Requirements

A user requirement consists of an identifier, a title, a statement, and a sequence of attributes. Predefined paragraph formats exist for all of these.

7.2.1 The statement of a user requirement

The body file of the URD template contains a number of special paragraph formats reserved for user requirements. The paragraph formats to specify a user requirement are:

UR Att Identifier

To specify the identifier for the requirement, which must be chosen manually. E.g. in Example 21, the identifier is “2-6”.

UR Title

To specify a short title for the requirement. The title and the identifier are used for the automatically generated list of requirements, at the end of the document. You may choose to omit the UR title, in which case you will need to re-setup the LOR file to use the *UR Statement* as source paragraph (*Book File/Set up file...*).

UR Statement

A simple sentence that clearly states the requirement. E.g. in Example 21, the UR statement is: “For each material, for each particle, for each process, it will be possible to compute the cross section.”

If needed, more explanation of the statement may be provided using any of the paragraphs described in Section 5.2, “Paragraph formats for general purposes” and in Section 5.3, “Paragraph formats for list items” (see Example 22).

7.2.2 The attributes required by PSS-05

PSS-05 requires the following attributes to follow the requirement statement. For each of these attributes, a dedicated paragraph format is used, as indicated in the list below¹.

UR Att Need

Essential user requirements **shall** be marked as such. Essential user requirements are non-negotiable; others may be less vitally important and subject to negotiation.

UR Att Priority

For incremental delivery, each user requirement **shall** include a measure of priority so that the developer can decide the production schedule.

UR Att Stability

Some user requirements may be known to be stable over the expected life of the software; others may be more dependent on feedback from the SR, AD and DD phases, or may be subject to change during the software life cycle. Such unstable requirements **should** be flagged.

UR Att Source

The source of each user requirement **shall** be stated. This may be a reference to an external document (e.g. system requirement document) or the name of the user, or user group, that provided the user requirement.

UR Att Clarity

A user requirement is clear if it has one, and only one, interpretation. Clarity implies lack of ambiguity. If a term used in a particular context has multiple meanings, the term **should** be qualified or replaced with a more specific term.

1. Description of each attribute is taken directly from *Software Engineering Standards* [1].

UR Att Verifiability

Each user requirement **shall** be verifiable. This means that it must be possible to:

- check that the requirement has been incorporated in the design;
- prove that the software will implement the requirement;
- test that the software does implement the requirement.

Note that if a carriage return is entered while in a *UR Att Need* paragraph, a *UR Att Priority* is automatically created, while in a *UR Att Priority* paragraph, a *UR Att Stability* is automatically created, etc, all the way down to *UR Att Verifiability*.¹

UR 2-6 Computation of cross-section

For each material, for each particle, for each process, it will be possible to compute the cross section.

Need	To be filled after the prototype.
Priority	To be filled after the prototype.
Stability	To be filled after the prototype.
Source	RD44
Clarity	To be filled after the first review.
Verifiability	To be filled after the prototype.

Example 21 A UR specifying all PSS-05 mandatory attributes.¹

UR 3-9 Event reconstruction tools

GEANT4 will provide some tools useful in the context of event reconstruction:

1. compute average trajectories, taking account only fields and mean energy loss, without fluctuations. This track evaluation must be forward or backward (i.e. time reversed)
2. together with the track evaluation, calculate and propagate the covariant error matrix due to the random processes (mainly multiple scattering and energy loss fluctuations)
3. fit track segments.

Need	To be filled after the prototype.
Priority	To be filled after the prototype.
Stability	To be filled after the prototype.
Source	RD44
Clarity	To be filled after the first review.
Verifiability	To be filled after the prototype.

Example 22 A UR using list items to qualify the statement.²

1. Taken from GEANT4 URD, Version 3.1, dated 1 June, 1995.
2. Taken from GEANT4 URD, Version 3.1, dated 1 June, 1995.

7.2.3 Other predefined attributes for user requirements

Other dedicated paragraph formats for UR attribute are included for convenience of the editor as well as suggestions. These are:

UR Att CompiledBy

Name of the editor/author of this requirement.

UR Att LastRevised

Last revision date of this requirement.

UR Att Release

The planned release version of the product in which this requirement will be implemented for the first time.

UR Att Status

Status of this attribute, e.g. Draft, ..., Final.

UR Att Version

To version control individual requirements; the version of this requirement.

UR Att Note

Free text to expand on arbitrary related points.

UR Att Example

To illustrate this requirement; an example from the user's point of view.

7.2.4 Arbitrary attributes for user requirements

A pair of paragraph formats are reserved for other arbitrary attributes that may need to be added, as shown in Example 23. These are:

UR Attribute Name

The names of the custom “attributes” in Example 23, such as “**Feasibility**” or “**Cross-Reference**” are tagged with this paragraph format.

UR Attribute Body

The values of the custom “attributes” in Example 23, such as “OK.” or “UR 1.2 and UR 1.3.” are tagged with this paragraph format.

UR 1.2	...
UR 1.3	...
UR 3.2.5.6	Velocity profile without discontinuities in acceleration.
Description	An adequate profile must be calculated to avoid any discontinuities in the acceleration values but respecting limits values for acceleration, deceleration (UR 1.2) and velocity (UR 1.3). This requirement comes from the fact that acceleration discontinuities cause reaction forces in the structure.
Feasibility	OK.
Consequences of loss of requirement availability	No control on the velocity profile would have dangerous consequences on Robertino mechanical structure.
Need	negotiable.
Priority	not-applicable for the first RCS version.
Stability	totally stable for the whole software life cycle.
Source	E.R.
Clarity	OK.
Verifiability	by design-implementation-testing.
Cross-Reference	UR 1.2 and UR 1.3 .

Example 23 A UR using custom attributes in addition to those required by PSS-05.¹

1. From Robertino Control System (RCS) Software URD, Version 1.0, dated 1/12/1994.

7.2.5 Formatting user requirements using a UR table

You may optionally wish to format user requirements using tables. You can thus set up a table such as the one shown in Example 24 then use it to format each user requirement. A copy of this table is available from the You can pre-configure a copy of such a table, with the subset of attributes that you want to see for each requirement in your document, and use it for each requirement. Thus, you can create a new requirement by copying and pasting the customised UR table into a blank *BodyPlaceHolder* paragraph. Advantage of this is that you can fit more than one attribute on the same line.

UR TBL Synopsis of the User Requirement			
[UR Statement]			
Need	[How essential is this UR]	Priority	[Priority for incremental delivery]
Clarity	[If more than one interpretation possible, this must be qualified]	Source	Name of person, group, document, ... from which the UR originates]
Stability	[How subject to change is this UR]	Version	[Version of this UR]
Compiled by	[Person name]	Last Revision Date][e.g. Day Month Year]
First implementation	[Software Release]	Status	[draft, under review, final, ...]
Verifiability	[Check that UR is incorporated into the design, is implemented in the software, and can be tested]	Example	...
Note	...		

Example 24 Sample of a table-formatted user requirement.

7.2.6 Managing modifications to user requirements

In addition to using the special character formats mentioned in Section 5.8.1, "Special character formats for change management", two paragraph styles are provided to mark whether a *UR Statement* has been changed or removed. These are:

UR Title Changed and UR Statement Changed

In the printed version, such paragraphs are overlined.

UR Title Removed and UR Statement Removed

In the printed version, such paragraphs are stricken-through.

Example 25 shows the same User Requirement in three different ways:

1. As it was first stated, thus it is tagged with the *UR Statement* format.
2. After a review and a modification has been affected, thus it is tagged with the *UR Statement Changed* format.
3. After another review and it has been decided that this requirement should be dropped, thus it is tagged with the *UR Statement Removed* format.

UR Ex-4 WebMaker is generic; it is able to handle the conversion of any document generated by a Frame Product.

UR Ex-4 WebMaker is generic; it is able to handle the conversion of any FrameMaker 3.0 and 4.0 document.

UR Ex-4 ~~WebMaker is generic; it is able to handle the conversion of any FrameMaker 3.0 and 4.0 document.~~

Example 25 A UR statement before it is changed, after it is changed, and after it is removed.

Note about the UR Identifier This should never change and, obviously, it should be unique. Thus, the three versions of **UR Ex-4** in Example 25 show the same UR in three different issues of the URD. The same UR identifier should never occur more than once in the same URD, and, even after a UR has been dropped, its identifier may not be reused.

7.2.7 Special headings for the “Specific Requirements” section

If you would like to have the generated list of user requirements (LOR) to also include the logical headings used in the Chapter “Specific Requirements” then you can use the series of *UR Hn* instead of the normal *Hn* heading formats. These headings look exactly the same; the only difference between the two sets is that the *UR Hn* series will show up in the generated LOR as well as the TOC.

3.1 Second level heading (*UR H2*)

3.1.1 Third level heading (*UR H3*)

3.1.1.1 Fourth level heading (*UR H4*)

3.1.1.1.1 Fifth level heading (*UR H5*)

3.1.1.1.1.1 Sixth level heading (*UR H6*)

Example 26 Five levels of special headings that are also automatically included in the LOR.

8 Formats Specific to the Appendices File

The main difference between the appendix and main document body is numbering. All the formats described in Section 5, "General Formats" are also available to the appendix but headings, figures, tables and equations are different. These are described here.

If it is desired not to include this file in the document then it may simply be deleted from the book, in the same manner as described in Appendix A.3.1, "To delete an automatically generated file". To re-add, simply:

1. From the book *File* menu, select *Add File...*
2. Turn on *Document File*:
3. Type the filename of the appendix file, e.g. *URD_app.fm*.
4. Set the position of where the file is to be added in the book and click on *Add*.
5. Update the book as explained in Appendix A.2.

8.1 Headings in the appendices

There are six levels of heading formats, having tag names *H1 Appendix* to *H6 Appendix*. The behaviour of these formats is equivalent to that of the numbered headings described in Section 7, "Formats Specific to the Main Body File". The difference being only the numbering scheme.

C Top level appendix heading (*H1 Appendix*)

C.1 Second level appendix heading (*H2 Appendix*)

C.1.1 Third level appendix heading (*H3 Appendix*)

C.1.1.1 Fourth level appendix heading (*H4 Appendix*)

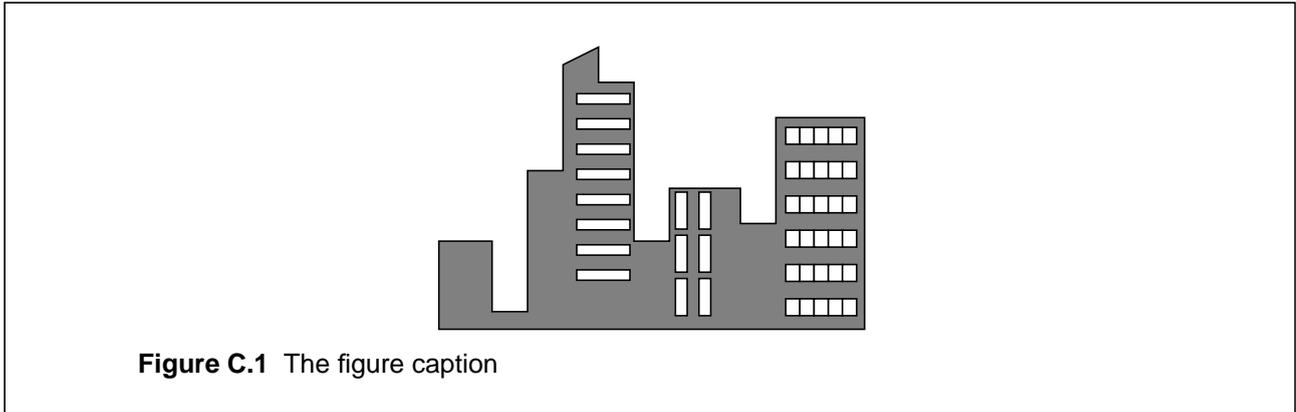
C.1.1.1.1 Fifth level appendix heading (*H5 Appendix*)

C.1.1.1.1.1 Sixth level appendix heading (*H6 Appendix*)

Example 27 Six levels of appendix headings.

8.2 Figure captions in the appendices

Figures in the appendices are inserted exactly the same way as described in Section 7, "Formats Specific to the Main Body File". The difference being only the in the numbering scheme of the figure caption.



Example 28 A figure in the appendices using the table format *Figure*.

A paragraph tagged *Figure Caption Appendix* is automatically inserted in the lower cell of the predefined table format *Figure*.

8.3 Table titles in the appendices

Tables in the appendices are inserted in exactly the same way as in "Formats Specific to the Main Body File", described in Section 7. The automatically inserted *Table Title Appendix* is numbered differently.

Table C.1

Example 29 The table title in the appendices.

8.4 Equations in the appendices

Mathematical equations in the appendices are inserted in exactly the same way as described in Section 7, "Formats Specific to the Main Body File". However, the paragraph tag used is *Body Equation Appendix*, which is numbered differently.

$$\tau = 2^7 \left(-b_0 + \sum_{i=1}^7 b_i 2^{-i} \right) \quad (\text{C.1})$$

Example 30 A numbered mathematical equation in the appendices.

9 Generating the WWW version

The template is already configured such that documents prepared using it can take advantage of the new *Save as HTML...* module that comes with FrameMaker 5.5. This configuration assumes that entire books, as opposed to single individual files, are saved as HTML. Another possibility as a format appropriate for distribution on WWW is PDF, supported by the new FrameMaker 5.5 *Save as PDF..* feature, explained below.

The configuration for conversion on the reference pages would need to be individualised to the actual document. Finally, after each time that a document is saved as HTML, a few steps require to be performed manually.

9.1 Before saving as HTML...

Prior to saving as HTML with FrameMaker 5.5 you need to individualize the configuration for the conversion. Go to the *BookHTML* reference pages (*View:Reference Pages*), locate the *Systems Macros* table, and modify the following information, as necessary:

- The context links in macros *StartOfDoc*, *StartOfSubDoc* and *StartOfLastSubDoc*. The HTML code, shown below, is inserted at the beginning of every generated HTML page. You may wish to change it.

```
<strong><a href="http://www.cern.ch/">CERN</a> | <a href="http://www.cern.ch/IPT/">IPT Group</a> | <a href="http://www.cern.ch/FrameMaker">FrameMaker at CERN</a> </strong>
```

- The title text for the document, in macros *StartOfDoc*, *StartOfSubDoc* and *StartOfLastSubDoc*, included in every generated HTML page. The initial value is shown below:

```
<p>PROJECT NAME User Requirements Document
```

- The signature of each generated HTML page, in macros *EndOfDoc*, *EndOfSubDoc* and *EndOfLastSubDoc*. In particular you may wish to change the date, the name of the webmaster, and the URL this is linked to, if any. The initial setting is:

```
<address>13 March 1998 - <a href="http://consult.cern.ch/xwho/people/XXXXX">WebMaster</a></address>
```

9.2 After saving as HTML...

After each time you save as HTML, you are required to (in the same directory as the generated HTML files):

1. Create a symbolic link `contents.html` that points to the generated file that contains the HTML version of the global table of contents. E.g. (UNIX):

```
ln -s proj-urd.3.html contents.html
```

Or, just copy the file:

```
cp -p proj-urd.3.html contents.html
```

2. Create a symbolic link `welcome.html` that points to the first file of the generated web. E.g. (UNIX):

```
ln -s proj-urd.html welcome.html
```

Or, just copy the file:

```
cp -p proj-urd.html welcome.html
```

3. Over-write the generated cascading style sheet file with the one provided with the template, *URD-Master.css*. E.g. (UNIX):

```
cp -p <template>/miscellaneous/URD-Master.css proj-urd.css
```

9.3 PDF

Saving as PDF is straight forward, except for the setting up of bookmarks. It is recommended that the same hierarchy as the FrameMaker table of contents is used. Thus, the list below *Include Paragraphs*: of the *Acrobat Setup* dialog should contain all heading paragraph tags, using the same hierarchy as in the generated table of contents.

To guarantee that hyperlinks within the document work properly in PDF, it is better to produce one PDF file for the entire document, as opposed to single ones for each source file.

9.4 Publishing the document on WWW

It is recommended that when publishing the address of a WWW document, the server *Welcome* feature is used, i.e. instead of the URL:

```
http://machine/path/Project/URD.html
```

one should publish:

```
http://machine/path/Project/
```

The *welcome.html* feature is not only more elegant but also has the advantage of reducing the problem of filename changes, if these were to occur.

A Maintenance Guidelines

A.1 Updating formats from a newer version of the template

For the automatically generated files just copy the ones from the template over the ones of the URD document in progress. These will be updated next time you update the book, as explained in Appendix A.2, "Updating (cross-references, numbering) and printing a book".

For all other files you need to do the following:

1. Open the file you want to update.
2. Open the template file that corresponds to the file that you want to update, i.e. one of *URD_pre.fm*, *URD_body.fm* or *URD_app.fm*.
3. From the *File* menu of the file you want to update select *Import:Formats...* (Esc fio)
4. Under *Import from Document*: select the corresponding template file.
5. Under *Import and Update*: check that all check-boxes are turned on.
6. Under *While Updating, Remove*: check that both check-boxes are turned on.
7. Click on *Import*.

After updating you will need to reset the meta-document variables, as explained in Section 3.6, "Filling in the title page", and to update the book as explained in Appendix A.2, "Updating (cross-references, numbering) and printing a book".

A.2 Updating (cross-references, numbering) and printing a book

Updating a book file means to update all cross-references and file numbering, and regenerate all automatically generated files. To update a book:

1. Select *Generate/Update* from the book *File* menu.
2. Make sure that all the automatically generated files are under *Generate*.
3. Click on *Generate*.

Before printing the book document, update the book.

A.3 Deleting/re-adding automatically generated files

The book template is set up with a number of automatically generated files. If any of these generated files are not desired, they can simply be removed. They may be re-added later if this becomes necessary.

A.3.1 To delete an automatically generated file

1. From the book *File* menu, select *Rearrange Files...*
2. Select the file to be removed from the book.
3. Press *Delete*.
4. Click on *Done*.
5. Update the book as explained in Appendix A.2.

Note that this will simply modify the book file, and does not physically remove any files from disk.

A.3.2 To re-add a previously deleted file

This may be done with not much difficulty. However, each case is particular. Thus, for example, to re-add the previously deleted List of Figures, in a URD book:

1. From the book *File* menu, select *Add File...*
2. Under *Generated List* select *List of Figures*.
3. Under *Add File After* select *URD_TOC.fm*.
4. Click on *Add*.
5. Set the *Filename Suffix* to be *_LOF*.
6. Under the *Include Paragraphs Tagged* column, move the *Figure Caption* and *Figure Caption Appendix* paragraph formats.
7. Turn on *Create Hypertext Links*.
8. Set *Starting Page Side* to *Next Available Side*.
9. Update the book as explained in Appendix A.2.

Note that the above process assumes that the automatically generated file is still available in the same location as the rest of the book files. Particular information about each generated file may be found in Appendix B, "The Automatically Generated Files".

A.4 Porting a FrameMaker book to a newer version of FrameMaker

If you open a FrameMaker book with a newer version of the FrameMaker software, the automatically generated files may lose all their nice formatting. To avoid this problem you must make sure that all files are first properly opened before doing a Generate/Update. The steps to do this are:

1. Open the book file with FrameMaker
2. Hold down Shift key and click on the book file menu
3. Select *Open All Files in Book*
4. Select *Generate/Update*
5. Click on *Update*
6. Hold down Shift key and click on the book file menu
7. Select *Save All Files in Book*
8. Hold down Shift key and click on the book file menu
9. Select *Close All Files in Book*

A.5 Changing the template filenames

Simply changing the names of individual files in a FrameMaker book template will make inter-file cross-references unresolved. The following is a systematic way to rename all the files contained in a book that guarantees that no cross-reference will break because of the renaming. Remember that only the basename of the template filenames may be changed.

1. Save book file and all component files as MIF.
2. Rename each MIF file individually to use the newly chosen basename.
3. Edit each MIF to replace the string:

`<c\>[Old basename of book]`

with:

`<c\>[New basename of book]`

For example, to rename all component files of a URD such that the base filename becomes MyURD, edit all the MIFs to replace the string "`<c\>URD`" with the string "`<c\>MyURD`".

Remember that it is still a good idea to have names that conform to 8x3 lengths.

4. Save each MIF file back to doc.
5. Open book and update.

Note that this algorithm is provided until such time as a simple utility is written to automate this.



B The Automatically Generated Files

Warning!

The content of these files should never be edited manually. The information provided here is for maintenance purposes only.

To regenerate any automatic file:

1. From the *File* menu of the book file select *Generate/Update*.
2. Make sure that the file to be regenerated is under *Generate*.
3. Click *Update*.

Dedicated heading paragraph formats

Each generated file has a dedicated heading paragraph format. This enables special action to be taken when converting the document to WWW.

B.1 TOC: The Table of Contents file

Contains: Full Table of Contents for the document.

Generated from the paragraph formats:

H1 Abstract, H1 Status Sheet, H1 Change Record

H1 No Number, ..., H6 No Number

H1, ..., H6

H1 Appendix, ..., H6 Appendix

UR H2, ..., UR H6

Z:LOF+, Z:LOT+, Z:TM+, Z:LOR+

Suffix, when re-adding to book: *_TOC*

Heading paragraph format: *Z:TOC+*

B.2 LOF: The List of Figures file

Contains: The List of Figures for the document.

Generated from the paragraph formats:

Figure Caption

Figure Caption Appendix

Suffix, when re-adding to book: *_LOF*

Heading paragraph format: *Z:LOF+*

B.3 LOT: The List of Tables file

Contains: The List of Tables for the document.

Generated from the paragraph formats:

Table Title

Table Title Appendix

Suffix, when re-adding to book: *_LOT*

Heading paragraph format: *Z:LOT+*

B.4 LOR: The List of Requirements file

Contains: The List of Requirements stated in the document.

Generated from the paragraph formats:

UR H2, ..., UR H6

UR Att Identifier

Plus, either:

UR Title, UR Title Changed, UR Title Removed

Or:

UR Statement, UR Statement Changed, UR Statement Removed

Suffix, when re-adding to book: *_LOR*

Heading paragraph format: *Z:LOR+*

C FrameMaker Paragraph Formats Quick Reference

Table C.1 FrameMaker paragraph formats quick reference

Paragraph tag name	Comment	Occurs in	See
<i>Body Abstract</i>	Simple abstract text	*_pre.fm	Section 6.4
<i>Body Comment</i>	General comments	all files	Section 5.2
<i>Body Equation Appendix</i>	Mathematical equations in the appendices	*_app.fm	Section 8.4
<i>Body Equation</i>	Mathematical equations	*_pre.fm, *_body.fm	Section 5.2
<i>Body Inset</i>	Simple inset text	all files	Section 5.2
<i>Body Placeholder</i>	Format to contain an anchored frame or a table (no text)	all files	Section 5.2
<i>Body Preformatted</i>	Format with fixed width characters, for code listings, etc	all files	Section 5.2
<i>Body Small Note</i>	Simple small text	all files	Section 5.2
<i>Body TBD</i>	Record a action/discussion point in a document in progress	all files	Section 5.2
<i>Body</i>	General text	all files	Section 5.2
<i>DL1 Description</i>	Description in a level one glossary list	all files	Section 5.3.4
<i>DL1 Term RIH</i>	Term in a level one glossary list, as a Run-In Head	all files	Section 5.3.4
<i>DL1 Term</i>	Term in a level one glossary list	all files	Section 5.3.4
<i>DL2 Description</i>	Description in a level two glossary list	all files	Section 5.3.4
<i>DL2 Term RIH</i>	Term in a level two glossary list, as a Run-In Head	all files	Section 5.3.4
<i>DL2 Term</i>	Term in a level two glossary list	all files	Section 5.3.4
<i>Document: Author</i>	May occur only once on frontpage	*_pre.fm	Section 6.2
<i>Document: Creation Date</i>	May occur only once on frontpage	*_pre.fm	Section 6.2
<i>Document: Institution Name</i>	May occur only once on frontpage	*_pre.fm	Section 6.2
<i>Document: Issue</i>	May occur only once on frontpage	*_pre.fm	Section 6.2
<i>Document: Last Modified Date</i>	May occur only once on frontpage	*_pre.fm	Section 6.2
<i>Document: Project Name Qualification</i>	May occur only once on frontpage	*_pre.fm	Section 6.2
<i>Document: Project Name</i>	May occur only once on frontpage	*_pre.fm	Section 6.2
<i>Document: Reference</i>	May occur only once on frontpage	*_pre.fm	Section 6.2
<i>Document: Revision Number</i>	May occur only once on frontpage	*_pre.fm	Section 6.2
<i>Document: Type</i>	May occur only once on frontpage	*_pre.fm	Section 6.2
<i>Figure Caption Appendix</i>	Figure captions in the appendices	*_app.fm	Section 8.2

Table C.1 FrameMaker paragraph formats quick reference

Paragraph tag name	Comment	Occurs in	See
<i>Figure Caption</i>	Figure captions	*_pre.fm, *_body.fm	Section 5.5
<i>Footnote</i>	General footnotes	all files	Section 5.4
<i>H1 Abstract</i>	The Abstract heading	*_pre.fm	Section 6.4
<i>H1 Appendix</i>	Level one heading in the appendix	*_app.fm	Section 8.1
<i>H1 Change Record</i>	The Document Change Record heading	*_pre.fm	Section 6.4
<i>H1 No Number</i>	Level one heading in the front matter	*_pre.fm	Section 6.1
<i>H1 Status Sheet</i>	The Document Status Sheet heading	*_pre.fm	Section 6.4
<i>H1</i>	Level one heading	*_body.fm	Section 7.1
<i>H2 Appendix</i>	Level two heading in the appendix	*_app.fm	Section 8.1
<i>H2 No Number</i>	Level two heading in the front matter	*_pre.fm	Section 6.1
<i>H2</i>	Level two heading	*_body.fm	Section 7.1
<i>H3 Appendix</i>	Level three heading in the appendix	*_app.fm	Section 8.1
<i>H3 No Number</i>	Level three heading in the front matter	*_pre.fm	Section 6.1
<i>H3</i>	Level three heading	*_body.fm	Section 7.1
<i>H4 Appendix</i>	Level four heading in the appendix	*_app.fm	Section 8.1
<i>H4 No Number</i>	Level four heading in the front matter	*_pre.fm	Section 6.1
<i>H4</i>	Level four heading	*_body.fm	Section 7.1
<i>H5 Appendix</i>	Level five heading in the appendix	*_app.fm	Section 8.1
<i>H5 No Number</i>	Level five heading in the front matter	*_pre.fm	Section 6.1
<i>H5</i>	Level five heading	*_body.fm	Section 7.1
<i>H6 Appendix</i>	Level six heading in the appendix	*_app.fm	Section 8.1
<i>H6 No Number</i>	Level six heading in the front matter	*_pre.fm	Section 6.1
<i>H6</i>	Level six heading	*_body.fm	Section 7.1
<i>KeepRestOfPageClear</i>	For formatting only, to force next paragraph to start on next page	all files	Section 5.2
<i>L1 Bullet</i>	Bulleted list of level one	all files	Section 5.3.1
<i>L1 Continuation Preformatted</i>	Continuation of list items at level one, with fixed width font	all files	Section 5.3.3
<i>L1 Continuation</i>	Continuation of list items at level one	all files	Section 5.3.3
<i>L1 alphabetic 1st</i>	First alphabetically numbered list paragraph, of level one	all files	Section 5.3.2
<i>L1 alphabetic nth</i>	Second and later alphabetically numbered list paragraph, of level one	all files	Section 5.3.2
<i>L1 arabic 1st</i>	First numbered list paragraph, of level one	all files	Section 5.3.2
<i>L1 arabic nth</i>	Second and later numbered list paragraph, of level one	all files	Section 5.3.2
<i>L1 roman 1st</i>	First list paragraph ordered with roman numerals, of level one	all files	Section 5.3.2

Table C.1 FrameMaker paragraph formats quick reference

Paragraph tag name	Comment	Occurs in	See
<i>L1 roman nth</i>	Second and later list paragraph ordered with roman numerals, of level one	all files	Section 5.3.2
<i>L2 Bullet</i>	Bulleted list of level two	all files	Section 5.3.1
<i>L2 Continuation Preformatted</i>	Continuation of list items at level two, with fixed width font	all files	Section 5.3.3
<i>L2 Continuation</i>	Continuation of list items at level two	all files	Section 5.3.3
<i>L2 alphabetic 1st</i>	First alphabetically numbered list paragraph, of level two	all files	Section 5.3.2
<i>L2 alphabetic nth</i>	Second and later alphabetically numbered list paragraph, of level two	all files	Section 5.3.2
<i>L2 arabic 1st</i>	First numbered list paragraph, of level two	all files	Section 5.3.2
<i>L2 arabic nth</i>	Second and later numbered list paragraph, of level two	all files	Section 5.3.2
<i>L2 roman 1st</i>	First list paragraph ordered with roman numerals, of level two	all files	Section 5.3.2
<i>L2 roman nth</i>	Second and later list paragraph ordered with roman numerals, of level two	all files	Section 5.3.2
<i>L3 Bullet</i>	Bulleted list of level three	all files	Section 5.3.1
<i>L3 Continuation Preformatted</i>	Continuation of list items at level three, with fixed width font	all files	Section 5.3.3
<i>L3 Continuation</i>	Continuation of list items at level three	all files	Section 5.3.3
<i>L3 alphabetic 1st</i>	First alphabetically numbered list paragraph, of level three	all files	Section 5.3.2
<i>L3 alphabetic nth</i>	Second and later alphabetically numbered list paragraph, of level three	all files	Section 5.3.2
<i>L3 arabic 1st</i>	First numbered list paragraph, of level three	all files	Section 5.3.2
<i>L3 arabic nth</i>	Second and later numbered list paragraph, of level three	all files	Section 5.3.2
<i>L3 roman 1st</i>	First list paragraph ordered with roman numerals, of level three	all files	Section 5.3.2
<i>L3 roman nth</i>	Second and later list paragraph ordered with roman numerals, of level three	all files	Section 5.3.2
<i>Reference List</i>	References to external publications	all files	Section 5.4
<i>Table Cell Body Centred</i>	Centred text in a table cell	all files	Section 5.6
<i>Table Cell Body</i>	Text in a table cell	all files	Section 5.6
<i>Table Cell Heading</i>	Headings in teable cells	all files	Section 5.6
<i>Table Footnote</i>	Table fotnotes	all files	Section 5.6
<i>Table Title Appendix</i>	Table titles in the appendices	*_app.fm	Section 8.3
<i>Table Title</i>	Table titles	*_pre.fm, *_body.fm	Section 5.6
<i>UR Att Clarity</i>	Clarity attribute of user requirements	URD_body.fm	Section 7.2.2

Table C.1 FrameMaker paragraph formats quick reference

Paragraph tag name	Comment	Occurs in	See
<i>UR Att CompiledBy</i>	Name of the editor/author	URD_body.fm	Section 7.2.3
<i>UR Att Example</i>	To illustrate this requirement	URD_body.fm	Section 7.2.3
<i>UR Att Identifier</i>	Identifier of this requirement	URD_body.fm	Section 7.2.1
<i>UR Att LastRevised</i>	Last revision date of this requirement	URD_body.fm	Section 7.2.3
<i>UR Att Need</i>	Need attribute of user requirements	URD_body.fm	Section 7.2.2
<i>UR Att Note</i>	Free text to expand on arbitrary related points	URD_body.fm	Section 7.2.3
<i>UR Att Priority</i>	Priority attribute of user requirements	URD_body.fm	Section 7.2.2
<i>UR Att Release</i>	Planned product release version	URD_body.fm	Section 7.2.3
<i>UR Att Source</i>	Source attribute of user requirements	URD_body.fm	Section 7.2.2
<i>UR Att Stability</i>	Stability attribute of user requirements	URD_body.fm	Section 7.2.2
<i>UR Att Status</i>	Status of this attribute, e.g. Draft, ..., Final.	URD_body.fm	Section 7.2.3
<i>UR Att Verifiability</i>	Verifiability attribute of user requirements	URD_body.fm	Section 7.2.2
<i>UR Att Version</i>	The version of this requirement	URD_body.fm	Section 7.2.3
<i>UR Attribute Body</i>	Body of arbitrary attributes of user requirements	URD_body.fm	Section 7.2.4
<i>UR Attribute Name</i>	Name of arbitrary attributes of user requirements	URD_body.fm	Section 7.2.4
<i>UR H2</i>	As H2 - automatically included also in LOR	URD_body.fm	Section 7.2.7
<i>UR H3</i>	As H3 - automatically included also in LOR	URD_body.fm	Section 7.2.7
<i>UR H4</i>	As H4 - automatically included also in LOR	URD_body.fm	Section 7.2.7
<i>UR H5</i>	As H5 - automatically included also in LOR	URD_body.fm	Section 7.2.7
<i>UR H6</i>	As H6 - automatically included also in LOR	URD_body.fm	Section 7.2.7
<i>UR Statement</i>	Statement of user requirement	URD_body.fm	Section 7.2.1
<i>UR Statement Changed</i>	Modified user requirements	URD_body.fm	Section 7.2.6
<i>UR Statement Removed</i>	Deleted user requirements	URD_body.fm	Section 7.2.6
<i>UR Title</i>	User requirement title	URD_body.fm	Section 7.2.1
<i>UR Title Changed</i>	Modified user requirements title	URD_body.fm	Section 7.2.6
<i>UR Title Removed</i>	Deleted user requirements title	URD_body.fm	Section 7.2.6
<i>Z:LOF+</i>	Should not be used, needed for generated lists	*_pre.fm	Appendix B.2
<i>Z:LOR+</i>	Should not be used, needed for generated lists	*_pre.fm	Appendix B.4
<i>Z:LOT+</i>	Should not be used, needed for generated lists	*_pre.fm	Appendix B.3
<i>Z:TOC+</i>	Should not be used, needed for generated lists	*_pre.fm	Appendix B.1