The Engineer's Guide to Technical Writing

How to write a Proprietary User Manual

Written by Adrienne Gross as part of the training program "Technical Writing for Engineers" to be done 2007.

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Front image from:
http://www.biology.ualberta.ca/people/mike_harrington/images/dilbert.gif and
www.plu.edu/~english/img/book-thick.jpg

Revision Status

Issue	Date of Issue	Authority	Description
A	26 Oct 2006	A.Gross	Draft issued for Review

Overview

This document briefly describes how an engineer can write a XXX proprietary user manual. The information contained in this document is to be used in conjunction with a half-day course in technical writing (with PowerPoint).

Scope

This document is in sections relating to the processes involved in writing an effective proprietary user manual

- What is technical writing
- Types of technical writing
- Key terms
- Key pointers
- Stages of tech writing:
  - Planning
  - Writing
  - Diagrams
  - Review
  - Checklist
- Annex A: example of a proprietary user manual
- Annex B: example of a technical data pack
- Annex C: example of customer comments

For detailed information about technical writing, refer to the ***Resources for Technical Writing file*** in the directory.

Why learn about technical writing?

As there is approximately 1 tech writer for approx XXXXX engineers, there may be a time when you yourself need to write a manual. Also, not every contract requires detailed documentation to the standard that requires a technical writer.
Simply writing a basic set of instructions is not enough if you want your project to be an overall success. Manuals are what ensure that the design is used correctly and fixed correctly, thus making it easier for users and economical and professional for you as engineers.

http://departments.bloomu.edu/english/231f04/pulp44.jpg

Figure 1 - Technical Writing is NOT writing about technology

What is technical writing?

Technical writing is a particular method of conveying information to a user about how to do something.
It must be accurate, easy to understand and easy to maintain.

And guess what…on average, a professional user manual costs **$1000** a page.

Why bother writing in a technical manner?
The rules that can be applied to standard technical documentation enable the user to fulfil the intended design objectives; an effective instruction is an effective use of the product (which leads to less damage to equipment…less grief for engineers).

Your knowledge as an engineer coupled with effective communication leads to design success.
Why?
What good is a brilliant design if no-one knows how to use it? Unless the affordances of the design are in-built and obvious, how do you know people are using your design properly? How often have you had complaints about breakages?

http://images.google.com/imgres?imgurl=http://www.mobilemag.com/content/images/8525

Figure 2 – How would you assemble this without instructions?

Knowing HOW to use something is as important as what it can do.

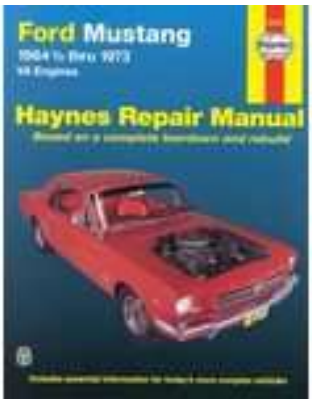
Types of technical writing

There are several types of technical writing. These types depend on:

- who the audience is (soldiers, technicians, home users)
- what the information is to be used for

The following table lists the types of technical writing and their features.

Technical Writing Document	Details
User manual – Proprietary	How to operate a device or perform a certain task. Written by engineers using XXX template in Word. Basic overview only.
User manual –DEF(AUST)	How to operate a device or perform a certain task. Written by technical writer/s using FrameMaker to standard DEF(AUST)5629B. Very detailed.
Quick reference guides	A summary of key points, often using purely diagrams. Assumes that the user has some knowledge of other information, or knows where to access it if want details
Maintainer Manuals	Process descriptions for how to prevent damage to equipment, identify faults and how to repair.
Policy documents	Lengthy documents that contain directions on behaviour, actions, authorities etc. e.g. Security Architecture Policy Plan
Reports	A set structure of aims, method and results, such as documenting a test or a seminar.
Tender Documents	Writing a submission and strongly marketing focused. Very detailed.



http://i19.ebayimg.com/03/c/00/c0/a5/4b_9.JPG

Figure 3 – Maintainer Manual

Key terms

Whenever technical writing is used, there are key terms that must be understood so that it is possible to meet the criteria of a “good” manual.
The terms are explained in the table below.

Term	Description
Usability	The degree of comprehension of any instruction. To examine the useability of a manual is to examine how clear the explanation is and thus how successful the user is at following the instruction.
Annex/Appendix/Attachment	Supplementary material usually attached at the end of a piece of writing (from Merriam Webster Online). This material is any that is not key to the understanding, but is useful for background knowledge/evidence
Manual	A set of instructions and supporting documentation about a product. A.k.a. guides, reference guides, instructions.  **Figure 4 - Understanding the manual helps with safety** http://www.ce-mag.com/ARG/00ARGCE262A.jpg
Index	An alphabetically ordered list at the back of a document that has page references to associated relevant topics within the document.
Glossary	An alphabetically ordered list of terms used within the document that require further explanation in order for the user to understand the text.

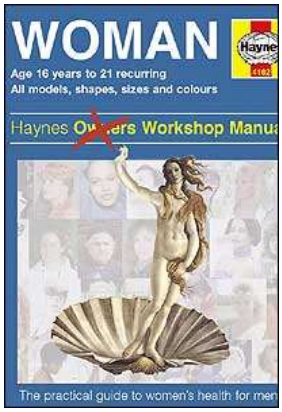


Figure 5 – A Manual contains instructions and guidance about a topic/object/product http://newsimg.bbc.co.uk/media/images/40112000/jpg/_40112348_manual300.jpg

Key pointers/phrases

If you remember only a few key points about technical writing, then these quotes summarise what technical writing is all about.

Quote	Explanation	Example
"Write fast, edit slow." (Alan Wishnia, Senior technical Writer, Adelaide)	If you are stuck on what to write, just write anything and clean it up later	Writing a User Manual; use the template and add bits and pieces under the headings so you know which info you are still missing
4 C's : 1. Clarity, 2. Consistency, 3. Conciseness, 4. Correctness	1. Be clear in what you write. 2. Use the same terms throughout the document 3. Write what you need to in as few words as possible. 4. Be accurate in what you write	*1.* Turn on the Power. NOT *Apply current to the subordinate power cable setting.* 2. DSN Router ONLY, not The 2811 Router, the Cisco Router etc. 3. See eg 1 4. "Plugging in the AC power will direct the signal to the power outlet." **IS NOT AN ACCURATE STATEMENT**
"Write to express, not to impress."	keep it simple, refrain from using adjectives	.. " *The highly efficient and technically superior router effortlessly directs the data…."*

"I heard you say you have writer's block. Well, I'm here to unblock it."

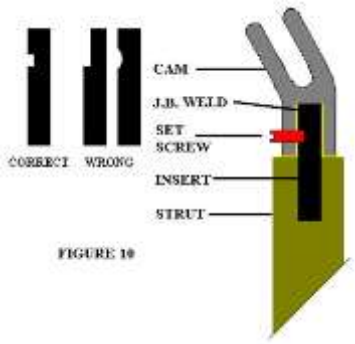
Figure 6 - Avoid the Head Beating - use the template headings and start writing

http://64.211.46.141/postcard/pictures/p32346.jpg

General Rules

As well as the key quotes to remember about technical writing, there are some general rules that will help to ensure effective understanding.

The following table summarises the general rules.

Rule	Example
No contractions	Don't break the switches; it's bad
No first person	When **you** press On, **you** will see…
Do explain all acronyms in full first time used within text	Insert the Internet Protocol Server (IPS) into the rack. The IPS is used to ……
Do not use acronyms in titles	**The IPS Config Process** *Should be…* **1. The Internet Protocol Server Configuration Process**
Do provide a brief statement of why the user needs to read any proceeding information	**1. The Internet Protocol Server Process** The following section describes how to change the settings for the IPS using Telnet.
Use diagrams wherever possible to summarise key points. Use text as well.	Weld the Set screw to the Cam by completely covering the surface area of the cavity. See the below figure for details.  http://www.centuryjet.com/webstore/graphics/Figure%2010.%20Cam%20and%20Set%20Screw%20Lg.JPG
Be consistent in terms	If you call something the DSN router once, don't call it the 2811 next the next paragraph.
Always introduce figures and tables	Don't just dump it in the document.
Keep asking yourself: does the user need to know this to use it? I.e cut out all the marketing spiel. The less irrelevant stuff is in the manual, the more seriously it will be taken.	POOR: The exceptionally light fiber optic examination device is intrinsically linked to the optimum setting of the magnificent Opto-Posi-Driver™. GOOD: The fiber optic test device is connected to the

Rule	Example
	default setting of the test program.
Warnings Cautions Notes:	
▪ Warnings: are for any danger to a person/s	**WARNING** The router is a 2-man lift piece of equipment. Do not attempt to lift without sufficient support. Failure to follow instruction may result in personal injury.
▪ Cautions: are for any danger to equipment	**CAUTION** When changing the PCA of the assembly, ensure that all ESD procedures are followed. Failure to follow instruction may result in equipment damage.
▪ Notes: are for general info pertaining to a step	**NOTE** The lock switch is hidden behind a panel. Remove the panel to access the switch.

Figure 7 – Did the manual include a caution to use ESD prevention equipment?

http://fluidpac.tripod.com/mvcpcb.jpg

General bits about Adult Learning (relevant to manual writing)

Technical writing can be judged as being poor or successful by using the general quotes and general rules. It is also important to consider the bigger picture of the purpose of the document and who is using it; often adults who are required to learn a procedure.

Therefore, for a manual to be the most effective, it must be written for adults who learn differently to children. The theory of adult learning is too in-depth to mention here, but the key points and how you cam apply them are explained in the table below.

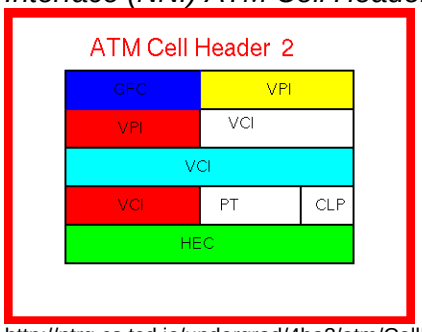
<table>
<tr><th>Topic</th><th>Details</th><th>Example</th></tr>
<tr>
<td>Content must be relevant

 
Figure 8 – ATM Switch Assembly</td>
<td>Only mention any information that is useful for the purpose of the document</td>
<td>If you are writing about how to configure an ATM switch, do not detail the physical features of the switch (eg dimensions, weight etc). Physical characteristics would apply to the equipment description section.

POOR EXAMPLE:
The 15kg Avocent CCV-987 ATM switch is configured by pressing the On switch. Set the ABR to 56, CBR to 44, VBR to 44, UBR to 18.

GOOD EXAMPLE:
NOTE
For more information regarding the function Voice Over Internet Protocol (VOIP), refer to Section 2.2 of this manual. For information regarding the equipment features and dimensions, refer to Section 4.3 of this manual.

Configuration of the ATM switch for VOIP is as follows:
1. On the front panel, press the On button.
2. Use iperf to access the configuration settings (See Section 2.3.2 “How to use iperf”.)
3. In the corresponding data entry fields, enter the data in the following table and press OK.
Table 1 – ATM Configuration
<table>
<tr><td>Port</td><td>Serial</td></tr>
<tr><td>Baud</td><td>9600</td></tr>
<tr><td>Parity</td><td>No</td></tr>
<tr><td>Data Bits</td><td>8</td></tr>
</table>
The ATM switch is now configured for VOIP.</td>
</tr>
</table>

Topic	Details	Example
Audience level of knowledge	Assess the level of knowledge and experience of the user and structure the content according to this	If the users are new recruits who are learning about a system with an ATM switch, assume that they do not know about cell relay network protocol and thus do not use complex terms. If you do use such terms, have a glossary and an annex explaining ATM switching.
Include diagrams and text.	Learners may be more visual-minded than word-based	If you are explaining what an ATM cell is, accompany the text with a picture. "*The ATM cell is the basic unit of information transfer in the B-ISDN ATM communication. The cell is comprised of 53 bytes. Five of the bytes make up the header field and the remaining 48 bytes form the user information field. The following is the structure of the Network Node Interface (NNI) ATM Cell Header*:  http://ntrg.cs.tcd.ie/undergrad/4ba2/atm/CellHead2.gif
Encourage permanent knowledge	Reinforce key statements by giving examples	 Sending data using ATM is like cars travelling to a destination. Each car is a cell that is driving along a road. The aim of the traffic controller is to get each car to the destination smoothly, without starts and stops. So the traffic controller (protocol) gives each car an identifier and sends the car out at an even time rate through the toll bridge (switch). Thus each car (cell of data) arrives at the other end evenly and does not jam.

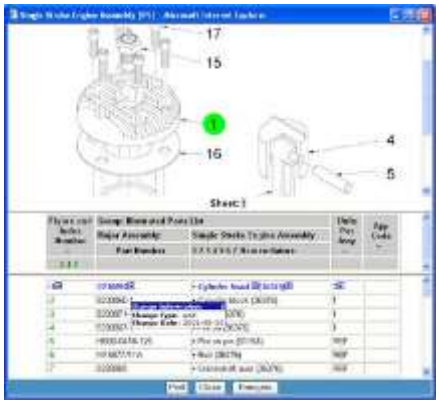
Stages of technical writing

When you design a new communication system, you don't just whack together a couple of routers and hope for the best. A good design is a planned design. The same goes for manuals.

Planning

The following table explains the considerations that the author must have during the planing stage of writing.

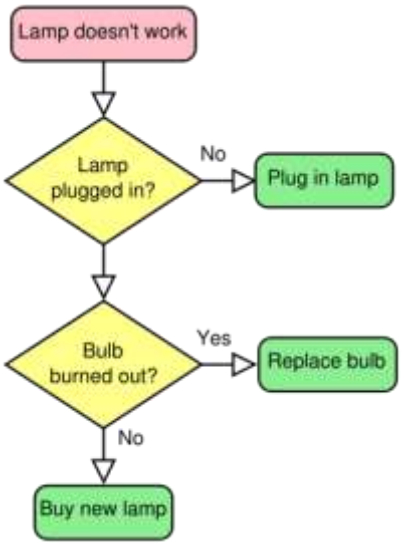
Consider…	Detailed	How/Example/Action
Who is using the information?	i.e what is the level of prior knowledge	Include a statement at the beginning of the manual about assumed knowledge. For example: "The following manual assumes that the operator has basic knowledge of networks and communications systems to the level of Certificate II Electronics and Networking. "
What does the contract say?	Is there a DID? Do you need full DEF(AUST) 5629B, or is a proprietary manual OK? How much of OEM manuals can you use? Do you have copyright permission for this? What kind of manual is it? User? Maintainer?	Get an agreement in writing in the form of a Technical Data Plan. See Annex B.
Where will it be used? 	Do you need to classify the info? Is it for outdoors use?	Configuration settings may need to be kept separate from the main text

Consider…	Detailed	How/Example/Action
When is the info due by?	Determines the level of effort and scheduling of tasks.	If you have months, then a detailed manual is possible. If you have weeks, a brief reference guide focussing mainly on operation and troubleshooting is better
Why need instructions?  **Figure 9 – A manual could be for repair and/or assembly**	To prevent injury? To operate? To repair? To install?	Determines the content of the manual
How produce the manual  **Figure 10 - The use of Interactive Electronic Technical Manuals (IETMs) is becoming more common**	Paper or html? Quick ref or full manual?	Manuals written by engineers would most likely be suited to paper, using Microsoft Word. This is due to the time consuming nature of IETMs.

Most importantly: get it straight with the customer as to what they want, and when by. This will determine the level of effort to go into the manual. Knowing the answer to these questions determines the structure of the document and the information that must be included to ensure that the manual meets the expectations /requirements.

Example Structure of a Proprietary User Manual

A typical structure for an Operator Manual/User Guide may be as shown in the below table. A blank template example of structure is also provided as Annex B.

Area of Manual	Details
Title page	project ref, logo/device image, title, approving authorities, issue date, issue rev.
List of amendments	date of amendment, who approved, when, description of what changed
Table of contents	include figures and tables.
Overview	what is the device and what is it used for
Scope	what is included in the document
Reference documents	if you refer to standards, OEM manuals etc.
Functional overview	list the capabilities of the device and how the user is able to perform them. About one paragraph per capability.
Equipment Description	have picture of each LRU and describe in a paragraph what it is and what it does.
Technical Description	(optional, perhaps as an annex) power supply levels, dimensions, weights, compliance specs
Operation	power on/off, configuration, install, and how to perform each of the prior stated capabilities. Include diagrams wherever possible.
Troubleshooting	identify a fault, correct the fault. Maybe include a flow chart.  **Figure 11 - An example of a troubleshooting flowchart** http://en.wikipedia.org/wiki/Image:LampFlowchart.svg
Acronyms and Abbreviations	List of two columns; acronym and full description
Annexes	May include OEM leaflets, configuration settings, equipment technical data, forms, drawings

Writing

The following table offers guidance to the written components of a manual. Note that these points are advice only and may vary depending on the style on manual you require.

Details	Poor Example	Good Example
When it comes to writing the nitty gritty of the steps and paragraphs, **keep it short and use dot points** wherever possible.	When turning on the router, ensure that the On button is pressed, the cord is fully extended and the LED is flashing and this will prevent the failure of the systematic access system which is used to access the keyboard attenuator.	To prevent failure of the systematic access system, perform the following tasks: 1. Turn on the router. 2. Ensure that the… 3. **Power** button is pressed 4. Cord is fully extended 5. LED is flashing. The system is now able to access the keyboard attenuator.  **Figure 12 - The LED Power button**
Use introductory sentences to new sections, tables, and figures	N/A	The following table explains the differences between Cell Relay Network Protocol and Packet-Switched networks…..
Minimise the amount of referencing to other manuals; if you are permitted to extract it and paste it in, this is easier for the user.	Power on the router as per Cisco manual 2811 Rev A page 2c. Ensure ESD safety is used as per Safety Directive AAS4334 Rev 3. Configure the router (See Section 2.3 of Cisco manual p 45).	 **Figure 13 - Can you extract the text from the OEM Manual?**

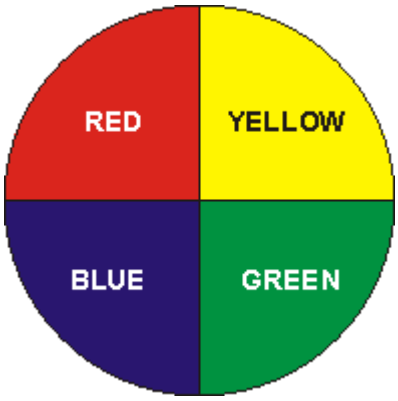
Details	Poor Example	Good Example
When writing steps, use an introduction, action/s and result	Put CD in drive. Go to Explorer to view. From the **Edit** menu select **Erase CD**.	**Erase a CD** The following steps describe how to erase data from a CD. **[INTRO]** 1. Put CD in drive. 2. Go to Explorer to view 3. From the **Edit** menu select **Erase CD**. **[ACTIONS]** The CD is now erased. **[RESULT]**
Bullets are used for non-sequential points. Numbers are used for sequential actions	**Brush Teeth** ○ Put toothpaste on brush ○ Wet brush with water ○ Brush teeth ○ Rinse **Why brush teeth?** 1. Fresh Breath 2. Prevent Cavities **3.** Looks whiter	**Brush Teeth** 1. Put toothpaste on brush 2. Wet brush with water 3. Brush teeth 4. Rinse **Why brush teeth?** ○ Fresh Breath ○ Prevent Cavities ○ Looks whiter
Numbering is consistent. Decide on alphanumeric (i.ii,iii, etc.) or Decimal (3., 3.1, 3.1.1 etc.)	3. Heading A Sub-heading i. Para 3.1.1. Para	3. Heading 3.1 Sub-heading 3.1.1 Para 3.1.2. Para
Headings are in Sentence Case, not CAPS	**ERASE A CD**	**Erase a CD**
Use present tense, not the future	The router will automatically direct the user to the console server settings.	The router automatically directs the user to the console server settings.
When writing numbers, use digits for 1-10 and words for numbers above 10	Connect the 5 fibre cable to the ports numbered 11 to 16.	Connect the 5 fibre cable to the ports numbered eleven to sixteen.
Numbers that begin a sentence are written as words	**33** ports are used to access the network.	**Thirty-three** ports are used to access the network.
Cross references are to sections, not pages	Refer to page 4 for more information about ATM switching.	Refer to section 1.2 “ATM Switching” for more information.
Reference Figures and Table with captions	For information about the previous steps, see below.	For further detail regarding steps 1-5, see Figure 12 – Router Interface.
keep figures on the same page as the text that references it.	**N/a**	**N/a**
keep tables within the same page	**N/a**	**N/a**

Details	Poor Example	Good Example
Use simple words: if necessary, explain complex terms in a glossary	Synchronise the protocol of the bit-rate distributor to the normalised setting of the hyperband expander network.	The following step explains how to set the clock of the bit-rate distributor to the default of the hyperband expander network (See Glossary). ○ Log in to Telnet and type the command **`v/xx-Hyper-time-UDP//.`** ○ Press **Send**
Warning, cautions and notes precede the text it applies to.  http://www.cvps.com/community/safety/toast1.gif	Turn Off power Insert the knife into the toaster to remove the crumbs. WARNING Ensure that power is disconnected before removing crumbs.	**WARNING** Ensure that power is disconnected before removing crumbs. Failure to follow instruction may result in death or personal injury. 1. Turn Off power and remove cord from outlet. 2. Insert the knife into the toaster to remove the crumbs. etc….
Start from the **outside to the inside** in when writing a step	Save the document.	"From the main menu, select the **File** menu item. Select the **Save Desktop** menu item." 

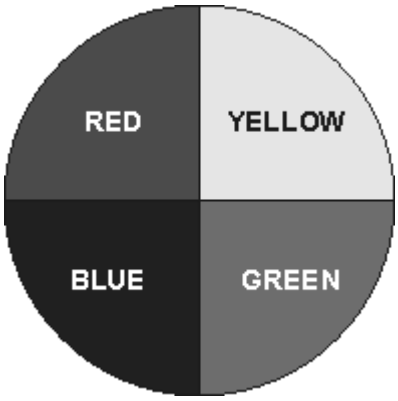
Diagrams

The following points offer some guidance to the visual components of a manual:

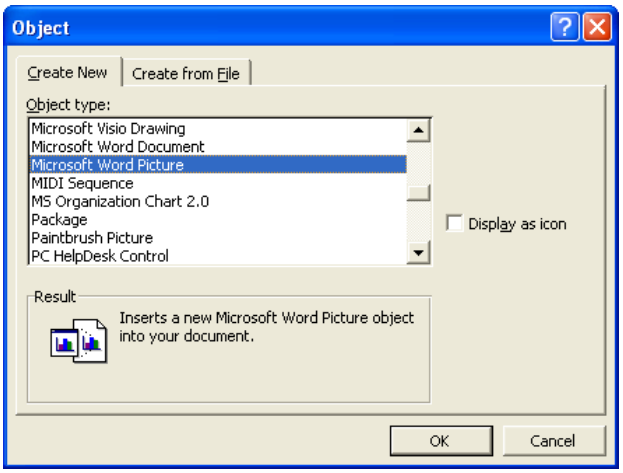
- Keep the same “look” between diagrams by using same program to develop them (eg Visio). Save the images separately so you can edit them later.
- Keep each image to less than 800k
- Screenshots: include basic screens (eg main menus) for information and specific screens (eg dialog boxes with data entry fields) for steps
- Design diagrams so that colour is not a determining factor in understanding. Eg use dashed lines instead of red vs black.

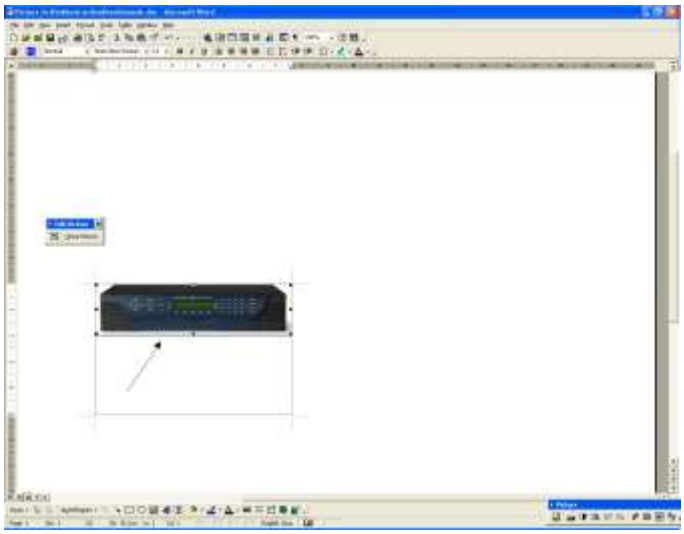


vs



- If you are using arrows on an image, insert as a Microsoft **picture object** rather than a floating image with floating arrows, as shown in the below images.





The Manual is now in draft form and can progress to the finishing stages.

Review

The following table is a checklist to follow in the review process:

Step	Done
Colleague has read the document for grammar, spelling and technical accuracy	
A non-technical minded person has read it for usability.	
Trial of the instructions to identify any missing steps.	
Draft issued to customer. Ask for formal comments to be issued as a customer comment form.	

Figure 14 - Ask a colleague to read the manual

http://www.atheistbooks.com/images/ManReading.jpg

Maintenance

The following table is a checklist to follow in the maintenance process of the manual:

Step	Done
Any amendments are listed in the amendment table.	
Amendments are accessible to other people (network drive, Sharepoint)	
Agreement with customer on final revision	
Record Customer comments and consequent actions on the correspondence sheet (Annex C).	

ANNEX C
EXAMPLE ONLY
BAE SYSTEMS RESPONSE TO PO COMMENTS ON:
Deliverable: No. Draft Dated DD Mon YYYY
(FULL TITLE)

LSN	Document Reference	Commonwealth Comments	BAE Systems Response	Action Done (Y/N)
1	Sect: General	The comments provided are not exhaustive but indicative of the points requiring attention throughout the document.	Noted.	
2	Sect: General	* Figure numbering requires review throughout the document, an example of inconsistency is at Sect 1 Chap 2	Noted.	
3	Sect: General	Request the use of Main headings be reviewed and where they are unnecessary demote them to Group Headings.	Noted.	
4	Sect: Main Page: WARNING, CAUTION and NOTE Paragraphs	* To improve the readability of Precautionary paragraphs eg Warnings and Cautions, request that these paragraphs be formatted in 12 point bold, upper and lower case.	Agree. BAE Systems will create templates to incorporate warning and caution styles to comply with DEF AUST 5629B.	
5	Sect: Prelim Pages	The comments provided against XXXX are similar if not identical to XXXX.	Noted.	
6	Sect: Sect 1, Chap 1	Request the Chapter heading "GENERAL" be amended to read "INTRODUCTION" and the Main heading "Introduction" be deleted.	Agreed.	
			Disagree.	
			Etc.	

Figure 15 - Use a Customer Comments Sheet to track changes

Checklist

The following table is a list to use as a guide when checking the manual.

Topic	Done
Customer has agreed to structure and method of manual writing	
Skeleton document done (headings, sections, paras etc)	
Information sourced and written into document	
Sections begin with an introductory statement	
Tables on same page	
Diagrams have same “look”	
Images under 800k each	
Images can be understood in greyscale	
No contractions	
Acronyms explained in text and acronym table	
No acronyms in title headings	
Headings are in Sentence case not CAPS	
All information is relevant for the section it is in	
All terms are consistent	
Steps have an introduction, action/s, result	
Bullets are used for non sequential points	
Numbers: 1-10 are written as numbers, 10+ are words (eg “eleven”	
Only use present tense (no future)	
Warnings, cautions, notes are before the relevant text	
All references to other documents are included in the ref docs table	
Figures and tables are referred to in-text	
No complex words	
Complex terms are explained in a glossary	
Review for technical accuracy	
Review for spelling and grammar	
Trial/Validation by third party	
TOC Updated	
Cross references match referenced text	
Customer Review	
Comments from customer actioned and recorded	
Revision is issued	

ANNEX A

How to Use the Proprietary Manual template

Overview

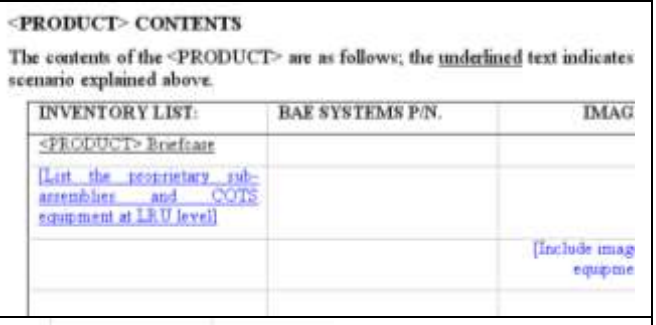
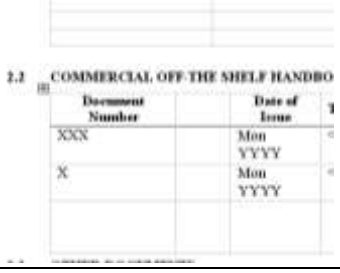
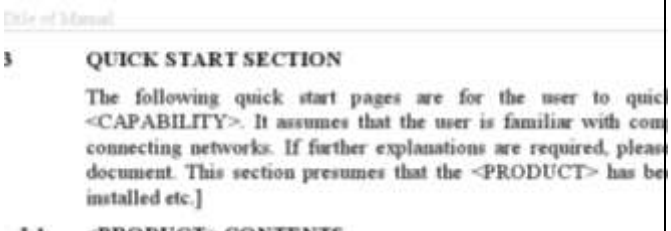
This template (Titled ProprietaryUserManualTemplate.doc) is based on a User Manual for the XXXXX System (XXXXs). It is a transportable communications system to interface to ISDN, LAN etc. The XXXS a set of OEM equipment housed in a briefcase, and also includes proprietary boards to interface between equipment.

The template can thus be used for any design that involves assemblies of OEM equipment.

Copy the template and save the document as per your product.

Conventions

The table below shows examples of the conventions used in the template, and the action required by you, the author.

If you see…	Then….	Example
[Blue text in square brackets]	You need to write something that is specific to your design/product	
XXXXX	Replace the word and/or reference with the applicable one to your design	
<CAPS TEXT IN *GREATER THAN/LESS THAN* SYMBOLS>	Insert the applicable text that the label is asking for.	
Black bordered box with **IMAGE HERE OF…**	Insert an image that corresponds to the instruction in the box and the instructional text above it.	

Styles

The following table describes the styles used in the template and when to use them. Note that this table does not include every style (these are ones that you do not need as they are for text that is common to all docs)

Style Name	Use for	Example
a. 1,2,3	Sequential steps	The tear down procedure for <PRODUCT> is as follows: 1. Terminate data connection/log off? 2. Turn off power (at GPO or switch).
ANNEX A	Annex Titles	ANNEX B
Caption	Captions	Figure 1 – Setup for <PRODUCT>
Heading 1	Section Headings	9 Configuration Settings
Heading 2	Sub-section Headings	9.1 <SUBASSEMBLY>Configuration Settings
Heading 3	Sub-sub-section headings	9.1.1 <SUBASSEMBLY>Advanced Configuration Settings
a. non-sequential	Points that or not sequential, eg a list of functions	The PRODUCT is used to a. monitor b. control c. configure
Para	Any text that is just general information, Ie not a step.	This document describes the operating instructions for the <FULL NAME> (<PRODUCT>) equipment. The purpose of this document is to provide information to the user regarding the operational and configuration material for the <PRODUCT>.

Steps
The following table describes how to complete the template for each page.

Page Number and Description	**Insert/Complete**	**Done?**
Page 1. Title Page	Full Name of product Image Doc No. Doc Issue Date of Issue Prepared by, approved by	
Page 2. Change History	Dates Issue numbers and details Document storage Office version	
Page 3-5 Contents	Update fields as appropriate	
Page 6 Introduction	Scope Document overview	
Page 7 Applicable Documents	XXX Systems docs COTS doc Other docs	
Page 8 Quick Start	Capabilities List of equipment Images XXX Part numbers	
Page 9 Quick start steps	Images of setup and steps Steps for startup/installation	
Page 10 Functional Description	Overview of capabilities What are the subassemblies and what are their roles Image of main design features Subassembly role	
Page 11 Operational Description	List of subassemblies How the subassemblies are arranged Diagrams of arrangement	
Page 12 <SUBASSEMBLY> Controls and Indicators	Image of panel switches with balloon call-outs Indicator states Button actions Button title Description of button action	
Page 13 Panel Interfaces and connectors	Image of connectors with balloon call-outs Description of the connector Connected to	
Page 14 <SUBASSEMBLY> Functional Description	Role of the SUBASSEMBLY in the system. Interfaces with other assemblies. Content about what happens when action is initiated (data flows, screen opens, etc) Image of data flow diagram, circuits, interfaces with other devices etc	

Page Number and Description	**Insert/Complete**	**Done?**
Page 15 Equipment	List the SUBASSEMBLIES of the product and what actions it performs (eg routing, controlling etc) Cables list	
Page 16-17 Operating Instructions	Safety warnings, cautions, notes Setup Tear Down	
Page 18 Configuration Procedures	How access the configuration Cables to connect to which ports Enter settings into table How to control the configuration with which commands.	
Page 19 Operational Procedures	Think of all the capabilities of your product. (ie Functional Specs) How would the operator carry them out? For example, *how to automatically reply to an Urgent message.* Then write down from start to finish how to do it, including menu access, buttons to push, if there are any warnings cautions, notes. End with a result statement. Eg "*The XXXX automatically replies to the Urgent Message*"	
Page 20-21 Technical Specs	Write/alter the introduction to suit why the operator would need to read the tech specs section. For the entire product/top level assembly, fill in (if applicable): weights and dimensions Power Requirements Environmental Requirements Power Setup Interface Specs, including connector pinout diagrams	
Page 22 Equipment Specification	Fill in the table for each SUBASSEMBLY with regards to weight, dimensions, power, data format etc. The OEM manuals are good sources for this info, or you might decide to refer directly to the OEM manuals and not copy out the info into your manual.	
Page 23 Troubleshooting	Write/alter the introduction paragraph to suit an overview of operator action upon identifying a fault (Eg what can they repair, what can they send back) Develop a flowchart. Start from power up and include all possible faults, their symptoms and repair actions. You may require more than one flow chart.	

Page Number and Description	**Insert/Complete**	**Done?**
Page 24-25 Troubleshooting Symptoms	Fill in the table to list symptoms (eg failed connection) Indications (eg flashing LED light, status report) Possible Fault (eg blown fuse) System Checks and Remedy (what does the operator need to do to identify which fault it is, eg run a report, check voltage etc) Remedy: replace, repair, return	
Page 26 Configuration Settings	For each SUBASSEMBLY, list the configuration settings to be input. You can display this as a report output, or a command table, or whatever suits. Note that if you have SECRET settings that these must be stored outside the manual	
Page 27 Indicators	Mainly for OEM SUBASSEMBLIES that were not previously listed in the equipment description section. List the meaning of each indicator display.	
Page 28 Acronyms and Abbreviation	List any acronym and abbreviation that you used in the document. The list has already been started for common acronyms. Delete as appropriate.	
Page 29 Connectivity Diagram	Insert a diagram that simplifies that theory of operation and connectivity of the product. Do not use cable diagrams. Instead, base your diagram on the high level functional diagram perhaps used for a tender/deign review. It is a general reference only.	

ANNEX B

Example of Technical Data Plan

Annex B is a copy of a Technical Data Plan produced by the Commonwealth. Use it as a reference if you are required to develop one yourself or are given one to follow. Section 7 is particularly relevant to manuals.

NOTE

CALS (Continuous Acquisition and Life-cycle Support) is a DOD initiative for electronically capturing military documentation and linking related information. CALS includes standards for electronic data interchange, electronic technical documentation, and guidelines for process improvement. (Source, Wikipedia, http://en.wikipedia.org/wiki/CALS_%28DOD%29, Accessed 26 October 2006.)

1. **DID NUMBER: DID-ILS-XXXX**

2. **TITLE: TECHNICAL DATA PLAN (TDP)**

3. **DESCRIPTION AND INTENDED USE**

3.1 The Technical Data Plan (TDP) describes the Contractor's strategy, plans, methodology, and processes for meeting the Contract requirements for the identification, assembly, preparation, validation and delivery of Technical Data.

3.2 The Contractor uses the TDP to:

a. define, manage and monitor the Technical Data activities under the Contract; and

b. ensure that those parties (including Subcontractors) who are undertaking Technical Data activities understand their respective responsibilities, the processes to be used, and the time-frames involved.

3.3 The Commonwealth uses the TDP to:

a. understand and evaluate the Contractor's approach to meeting the Technical Data requirements of the Contract; and

b. identify and understand the Commonwealth's involvement in the Contractor's Technical Data activities, including the monitoring of the Contractor's activities.

4. **INTER-RELATIONSHIPS**

4.1 The TDP inter-relates with the following data items:

a. Contract Work Break Down Structure (DID-MGT-120);

b. Master Record Index (DID-CM-120);

c. Configuration Status Accounting Record (DID-CM-110);

d. Technical Documentation Tree (DID-ENG-500);

e. Engineering Drawings (DID-ENG-700);

f. not used;

g. Technical Data List (DID-ILS-1010);

h. Publications Tree (DID-ILS-1030);

i. Publications Packages (DID-ILS-1040);

j not used

k. Verification and Validation Plan (DID-V&V-100).

5. **APPLICABLE DOCUMENTS**

5.1 The following documents for a part of this DID to the extent specified herein.

DEF(AUST) 5629A Annex A RAN Statement of Requirement for Technical Manuals

DEF(AUST) 5085B Production of Military Technical Manuals

Def(Aust) 5647B Technical Manuals Acquisition Guidelines Handbook

Engineering Drawings – Acquisition and Preparation for Defence Equipments

ISO 10918 JPEG

MIL-M-38781 Manual, Checklists and Source Data, Storage and Maintenance Procedures

MIL-STD-974 Contractor Integrated Technical Information Service

MIL-STD-1840 Automated Interchange of Technical Information

MIL-STD-2361A Interface Standard, Digital Publication Development

MIL-STD-38784A Technical Manuals: General Style and Format Requirements

MIL-STD-40051A Preparation of Digital Technical Information for Multi-Output Presentation of Technical Manuals

MIL-PRF-28000 Digital Representation for Communication of Product Data: IGES Application Subsets and IGES Application Protocols

MIL-PRF-28001 Markup Requirements and Generic Style Specification for Electronic Printed Output and Exchange of Text

MIL-PRF-28002 Raster Graphics Representation in Binary Format

MIL-PRF-28003 Digital Representation for Communication of Illustration Data: CGM Application Profile

MIL-PRF-87268 Interactive Electronic Technical Manuals: General Content, Style, Format, and User-Interaction Requirements

MIL-PRF-87269 Database Revisable: For the Support of Interactive Electronic Technical Manuals

6. PREPARATION INSTRUCTIONS

6.1 Generic Format and Content

6.1.1 This data item shall comply with the general format, content and preparation instructions contained in the CDRL clause entitled "General Requirements For Data Items".

6.2 Specific Content

6.2.1 General

6.2.1.1 The TDP shall describe the objectives, scope, constraints, and assumptions associated with the Contractor's Technical Data activities. Any risks associated with these activities shall be documented in the Risk Register in accordance with the Approved Risk Management Plan.

6.2.2 Technical Data Organisation

6.2.2.1 The TDP shall describe the Contractor's organisational arrangements for meeting the TDP program requirements of the Contract, including:

a. the Contractor's and Approved Subcontractor's Technical Data organisational and managerial arrangements and how they integrate with the higher-level management structures and organisations; and

b. the responsibilities of the position within the Contractor's Technical Data activities which will have managerial responsibility and accountability for meeting the Technical Data requirements of the Contract.

6.2.3 Overview of Technical Data and Related Activities

6.2.3.1 The TDP shall provide an overview of the Contractor's program for meeting the Technical Data requirements of the Contract, including:

a. the major activities to be undertaken;

b. the integration of Subcontractors into the Contractor's Technical Data activities;

c. the interfaces between the Technical Data activities and the Systems Engineering (SE) and Integrated Logistics Support (ILS) programs, including the mechanisms for ensuring that the Technical Data activities and outcomes are consistent with the developmental outcomes for the ASTIS ;

d. the interfaces between the Technical Data activities and the configuration-management (CM) program;

e. if not addressed in other Data Items delivered to the Commonwealth, any issues or implications for the development and delivery of, or access to, any Technical Data, which arise from restrictions or caveats associated with export licences, Technical Assistance Agreements, or Intellectual Property rights;

f. if any Technical Data is to be placed into escrow, the identification of the proposed escrow agent, categories of Technical Data to be placed in escrow, and an outline plan for maintaining the currency of the Technical Data stored in escrow throughout the Life Of Type (LOT) of the Mission System; and

g. the expectations of the Contractor with respect to the Commonwealth, including proposed interfaces and interactions with Commonwealth agencies external to the Project Office.

6.2.4 Technical Data Requirements Analysis

6.2.4.1 The TDP shall describe the Contractor's strategy, methodology, and processes to be utilised to undertake a Technical Data requirements analysis, including:

a. the system for categorising Technical Data based on its intended purpose, origin, management approach or other criteria;

b. determining the appropriateness of existing Technical Data for use throughout the LOT of the <PRODUCT>;

c. not used; and

d. identifying and optimising the range and quantity of Technical Data required under the Contract, including:

(1) existing Technical Data that is expected to be suitable without modification,

(2) existing Technical Data that is expected to require modification, and

(3) proposed new Technical Data.

6.2.5 Technical Data Development – General

6.2.5.1 The TDP shall describe:

a. the Contractor's program of activities associated with the identification, design, development, and delivery of Technical Data (appropriately cross-referenced to the activities related to Technical Data in the Contract Master Schedule (CMS) and in any subordinate schedules);

b. the software tools to be applied to the generation and interpretation (authoring and viewing) of Technical Data;

c. the procedures, by category of Technical Data, for the receipt, review, configuration control, amendment, production and delivery of all Technical Data and associated supporting hardware and software for the <PRODUCT>;;

d. the procedures for the management and control of the Technical Data List (TDL) (DID-ILS1000) and the Data Accession List (DAL) (DID-ILS-1020);

e. the standards, by Technical Data category, for the preparation of Technical Data, including CALS standards and the proposed level of CALS compliance (refer clauses 6.2.6.2 and 6.2.6.3 of this DID);

f. the strategy, methodology and processes for validating the TDL;

g. the strategy, methodology and processes for the Contractor to validate Technical Data, including an indicative schedule and standards to be used; and

i. the proposed strategy and methodology for the Contractor to assist the Commonwealth in verifying Technical Data in accordance with DEF(AUST)5629A.

6.2.6 Technical Data Development – CALS

6.2.6.1 The TDP shall describe:

a. the strategy, methodology and processes to validate that each CALS data type complies with the relevant CALS exchange standard;

b. not used;

c. not used;

d. for Technical Data that is produced in accordance with DEF(AUST) 5629A, the methodology and processes to validate that the structure and set of the Standard Generalised Mark-up Language (SGML) tagging accords with the

Document Type Definition (DTD) (Army/Navy/RAAF Version) in DEF(AUST) 5629A; and

e. the methodology to validate that data file formats comply with MIL-STD-1840 and the methodology to validate the data file interpreters (eg, viewing tools) where they are provided as part of the Contract deliverables, including:

(1) the processes and timeframes for conducting compliance testing; and

(2) details pertaining to whether the Contractor proposes to conduct the testing using an internationally recognised testing authority, a central body, or an agency sub-contracted by the central body.

6.2.6.2 Not Used

6.2.6.3 Not Used

6.2.7 Technical Data Development – Publications

6.2.7.1 The TDP shall describe:

a. the strategy, methodology, processes, and standards associated with the identification, development and delivery of publications;

b. the strategy for validating the publications for readability, technical accuracy and grammatical correctness;

c. the Contractor's internal review and approval processes and procedures for publications prior to release to the Commonwealth, including in-process reviews, controls, and schedules;

d. the methodology for handling routine and priority changes and supplements;

e. not used; and

f. not used.

6.2.8 Not Used

6.2.9 Technical Data Development – Engineering Drawings

6.2.9.1 The TDP shall describe:

a. the strategy, methodology, processes, and standards associated with the identification, development and delivery of engineering drawings;

b. the indexing method employed by the Contractor to manage and control the suite of engineering drawings;

c. the strategy for validating the engineering drawings for technical accuracy; and

d. the methodology for handling routine and priority changes to engineering drawings.

6.2.9.2 Acceptable Non-CALS:

a. AutoCAD native drawing format (DWG) in accordance with versions used by the Commonwealth or as agreed by the Project Authority. Drawings

must be a direct output from the authoring system, and not the result of a translation process. All information necessary to open and manipulate the data files, including libraries, fonts, logical name definitions, and other supporting files shall be delivered with the drawing files; and

b. Autodesk Drawing Exchange Format (DXF) in accordance with versions used by the Commonwealth or as agreed by the Project Authority.

7. ANNEX A TO DID-ILS-1000

7.1 CURRENT COMMONWEALTH CALS STANDARDS

7.1.1 Technical Publications

7.1.1.1 The physical layout of technical publications accords with DEF(AUST) 5629A.

a. Primary CALS – Processable / Dynamic Documents:

(i) Text - MIL-PRF-28001, Standard Generalised Markup Language (SGML) applying the applicable Data Type Definitions (DTDs) (DEF(AUST) 5629A RAAF variant, aircrew manuals and checklists) supplied in the SGML GFI Pack;

(ii). Graphics - 2D vector illustrations, MIL-PRF-28003 Computer Graphics Metafile (CGM);

(iii) grey and colour raster - ISO 10918 JPEG; and

(iv) black and white raster - MIL-PRF-28002 raster type 1.

b. Alternative CALS:

(i) Text - MIL-PRF-28001, SGML applying a DTD not available in the CALS GFI Pack but may be approved for use by the Commonwealth;

(ii) Graphics - 2D vector illustrations, MIL-PRF-28000 initial graphics exchange specification (IGES), Class 1; and

(iii) Composed Document - Documents provided, which require no amendments throughout the life cycle of the equipment, may be delivered in MIL-PRF-28002 raster composed document format.

c. Acceptable Non-CALS:

(i) a neutral data file (platform independent file format) containing as a minimum hyper link referencing between the table of contents and the applicable text. Preference is for neutral file formats to Adobe and Tumbleweed portable document formats (PDF and EVY); and

(ii) native digital format in use by the Commonwealth (eg, Word 6 or later).

7.1.2 Engineering Drawings

7.1.2.1 Primary CALS:

a. MIL-PRF-28000 Initial Graphics Exchange Specification (IGES), Class Two (Engineering drawing subset); and

b. MIL-PRF-28002 Raster Graphics Representation in Binary Format, Class One (Scanned aperture card and hard copy).

ANNEX C

Example of a Customer Comments Sheet

EXAMPLE ONLY

XXX SYSTEMS RESPONSE TO PO COMMENTS ON:

Deliverable No. Draft Dated DD Mon YYYY
(FULL TITLE)

LSN	Document Reference	Commonwealth Comments	XXX Systems Response	Action Done (Y/N)
1	Sect: General	The comments provided are not exhaustive but indicative of the points requiring attention throughout the document.	Noted.	
2	Sect: General	* Figure numbering requires review throughout the document, an example of inconsistency is at Sect 1 Chap 2.	Noted.	
3	Sect: General	Request the use of Main headings be reviewed and where they are unnecessary demote them to Group Headings.	Noted.	
4	Sect: Main Page: WARNING, CAUTION and NOTE Paragraphs	* To improve the readability of Precautionary paragraphs eg Warnings and Cautions, request that these paragraphs be formatted in 12 point bold, upper and lower case.	Agree. XXX Systems will create templates to incorporate warning and caution styles to comply with DEF AUST 5629B.	
5	Sect: Prelim Pages	The comments provided against XXXX are similar if not identical to XXXX	Noted.	
6	Sect: Sect 1, Chap 1	Request the Chapter heading "GENERAL" be amended to read "INTRODUCTION" and the Main heading "Introduction" be deleted.	Agreed.	
			Disagree	
			Etc.	