



ATNP/WG3/IP \_\_\_\_

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**AERONAUTICAL TELECOMMUNICATION NETWORK PANEL**

**WORKING GROUP 3 (APPLICATIONS AND UPPER LAYERS)**

**Brussels, Belgium, 15 - 26 April, 1996**

**Eurocontrol Requirements Database for**  
**Application SARPs**

**INFORMATION PAPER**

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**SUMMARY**

This paper describes the status of the EUROCONTROL database of low-level requirements for some of the draft SARPs being developed by ATNP/WG3. The SARPs in question are: ADS, CM, CPDLC, ATIS(FIS) and Upper Layers. The database is offered as a tool to assist in the validation process.

## **1. Introduction**

As part of the ongoing validation activities within the Eurocontrol Trials End System (TES) project, the production of a Requirements Database (RDB) has been commissioned. This database is intended to track requirements expressed in draft SARPs at the lowest level of traceability (i.e. individual "shall" statements) and to record the validation status of each low-level requirement.

Although the emphasis within WG3 has now shifted to higher-level Validation Objectives, the low-level RDB still has a role to play. It has proved valuable in analysing the style of the draft SARPs addressed and finding typographical errors and inconsistencies in style, as well as instances of bad practice, such as a single clause containing two "shalls".

## **2. Current Status**

At the time of preparation of this paper (15 April 1996), the RDB has been developed and has been populated with low-level requirements from the following draft SARPs:

- ADS (Version 0.4, October 1995);
- CM (Version 2.0, February 1996 - cmgold.doc, from WG3 Brisbane meeting);
- CPDLC (Version 2.0, February 1996 - cpd200p.doc, from WG3 Brisbane meeting).

The RDB files corresponding to these draft SARPs have been loaded onto the CENA Validation Archive, and can be downloaded by any interested party.

A User Guide has been developed and is attached to this paper for information.

## **3. Next Steps**

Work is continuing to populate the RDB with the post-Brisbane versions of the FIS and UL SARPs, as well as updating the ADS database to align with the current version of the SARPs.

A number of minor operating difficulties with the database tools are also being addressed. Usability enhancements are under consideration.

A future development of the RDB will be to define explicit links between low-level requirements and the higher-level Validation Objectives, to facilitate the monitoring of validation coverage.

## **4. Conclusions**

The WG is invited to review the RDB activities. If requested, a demonstration of the tool can be arranged. The database is offered as a tool available to all WG3 members to assist in the validation process.

## **ANNEX A: Files on the Validation Archive**

The files currently on the CENA server, in directory atn-valid/val-db/wg3, are as follows:

<b>Filename</b>	<b>Description</b>
readme.txt	Installation guide.
view.zip	Files viewsarp.mdb, viewsarp.ldb contain the requirements viewing application.
sarpdb.zip	Files sarpdb.mdb, sarpdb.ldb contain an empty set of database tables. These files are used to hold new requirements databases.
cpdlcdb.zip	Files cpdlcdb.mdb, cpdlcdb.ldb contain the requirements database for the draft CPDLC SARPs. File cpd200p.doc contains the draft SARPs text, with tags added to "shall" statements.
cmdb.zip	Files cmdb.mdb, cmdb.ldb contain the requirements database for the draft CM SARPs. File cmgold.doc contains the draft SARPs text, with tags added to "shall" statements.
adsdb.zip	Files adsdb.mdb, adsdb.ldb contain the requirements database for section four of the draft ADS SARPs.
tools.zip	The file tools.doc contains the 'Shall' extraction macro code. This macro is used to extract 'Shall' statements from original SARPs documents during the database population process. It is not needed as part of the requirements database application.
userg0_a.zip	Version 0.A of the User Guide (copy attached to this paper)

## **ANNEX B: User Guide**

See the following attachment.



## **EACI PROGRAMME**

### **ATN End Systems**

(FCO.ET3.ST04)

### **User Guide for a requirements database to support the validation of SARPs**

#### **Abstract**

This document defines a user-guide for a requirements database developed to support the process of validation of SARPs. The SARPs are those being defined by ICAO ATNP/WG3 for the CNS/ATM-1 Package. The SARPs to be supported initially by the requirements database are the ADS SARPs and that for the Supporting Upper Layers.

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## 1. INTRODUCTION

This document defines a user manual for a requirements database and the supporting toolset. The requirements database has been developed to support the validation of ICAO Standards and Recommended Practises (SARPs). The database includes additional features to support traceability to the validation test programme together with facilities to support requirements analysis.

The SARPs documents contain a series of requirements, each associated with the word "Shall" resulting in "Shall statements". It is the series of "Shall statements" from a given SARPs that is loaded into the requirements database.

However, the editors of a SARPs do not necessarily provide a unique reference for each requirement. Thus, the SARPs is subject to some processing so that each requirement can be identified and then loaded into the database.

The database runs under Microsoft Access 2.0. A supporting tool set has also been developed which includes provision to process Microsoft Word 6.0 format SARPs documents using Word Macros. The supporting tools automate the process of populating the database by electronic transfer from the source document.

## 2. INSTALLATION OF THE DATABASE

### 2.1. System Requirements

The Requirements Database requires the following minimum system resources:

A 386 or higher microprocessor.

8MB of RAM.

VGA (640 \* 480) or higher resolution display.

7MB of free disk space.

MS Windows Version 3.1 or higher.

MS Access Version 2.0 or higher.

MS Word Version 6.0 ( Note: This is only required for displaying the original SARPs document and execution of the Shall extraction and Shall numbering macros.)

### 2.2. The Database Files

The following are the files required to use the requirements database application :-

**viewsarp.mdb,viewsarp.ldb** :- these files contains the requirement viewing application.

**adsdb.mdb,adsdb.ldb** :- these files contain the requirements database of the draft ADS SARPs. Section 4 of Version 0.1 of the SARPs was loaded for a trial associated with milestone 2 of Task 9. In addition, all of Version 0.4 of the SARPs was loaded for milestone 3.

**sarpdb.mdb,sarpdb.ldb** :- these files contain an empty set of database tables. These files are used to hold new requirements databases.

The above files should be copied into either the MS Access home directory, or in a directory which is on the operating system search path. A new directory can be created to store the database files and then added to the path by appending the new directory name to the 'PATH' variable in the 'autoexec.bat' file. e.g. if a new directory called SARPSDBS was created to hold the files then the path could be :-

PATH=C:\WINDOWS;C:\CPQDOS;C:\;C:\DOS;C:\MOUSE;C:\WINDOWS\CPQWIN;C:\WINDOWS\NLS;C\SARPSDBS

The full path of the database files containing the actual requirements data (e.g. ADSDB.MDB ) must be set within the requirement viewing application. To set these values use the 'Requirement Database Selection' form which is available by selecting the main menu option 'Select Database For Viewing'. The default locations for the files are displayed on the form. To set the new locations click on the appropriate fields and type the new values.

The full path of the original SARPs document file must also be set in the same way using the 'Requirement Database Selection' form. This location is needed so that the link to Word from within the 'Requirement Details' operates correctly.

The viewing application can be automatically opened whenever Access is started by setting the Access item properties as follows :-

- Click on the MS Access icon so that it is highlighted. From the Program Manager file menu select properties. A dialogue box appears displaying the Access properties.
- Add the viewing application database name along with its complete Path (e.g. C:\SARPSDB\VIEWESARP.MDB) to the end of the 'Command Line' property.

The viewing application will now be automatically started every time that MS Access is executed.

## 2.3. Additional Macros for "Word"

In support of the database, some tools in the form of macros are provided. These are stored in a file "tools.doc". The macros are used to generate "shall numbers" which form a unique reference for each "Shall statement" in the source document (SARPs).

To use the shall extraction and numbering macros they must be installed in the Word Templates from the 'tools.doc' file. To install a macro first open the 'tools.doc' file as a normal Word document. When this document is open 'cut' (using the word 'Edit' menu) the section from the document containing the code for the macro which is to be installed. The start point and end point of each macros code is identified within the document. From the Word 'Tools' menu select the 'Macro' option. A dialogue box appears containing details of currently installed macros. Type the name of the macro to be installed in the 'Macro Name' box (the name that each macro should be given is included along with the macro code in the 'tools.doc' file). The 'Create' button will now be highlighted. Clicking on this button opens a window for the new macro. From the 'Edit' menu choose 'Paste' to insert the macro code. The macro can now be saved and used on any document opened in Word.

## 3. USE OF THE DATABASE

### 3.1 Opening The Database

To open the Requirements database double click on the MS Access icon from Windows Program Manager. The viewing application will then be started by automatically opening the database 'VIEWESARP.MDB' (this is providing that the system has been set-up as detailed in the installation section of this document, otherwise the database must be opened from the Access 'File' menu). Standard Windows controls are available on all the forms of the Requirements Database. When the database is opened the following main menu is displayed.

The main menu may be considered as the top level screen (discussed in Section 3.2)

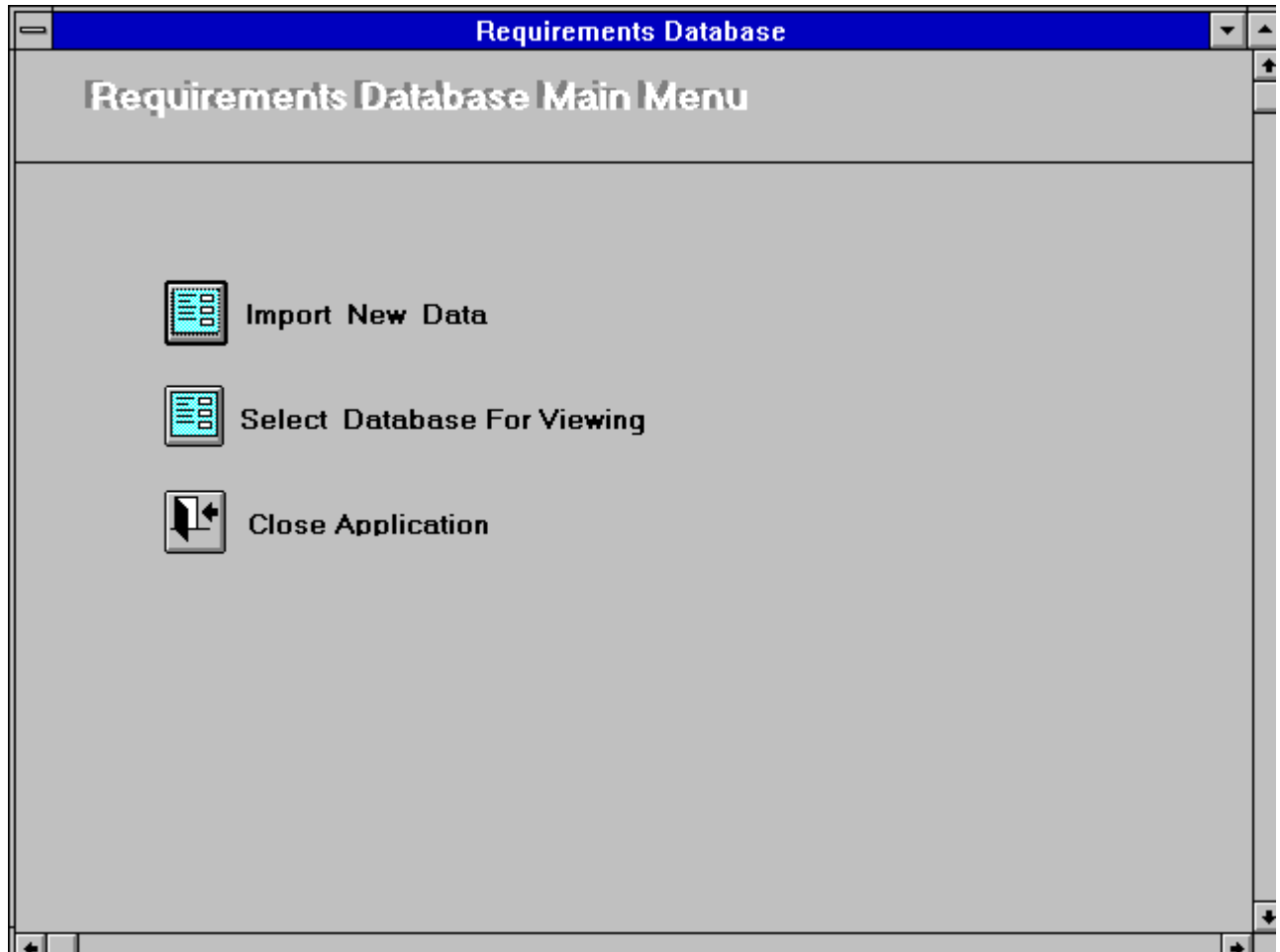
The main menu leads to one of two Second Level menus on second level screens:

- Import new data (discussed in Section 3.3)
- Select a database for viewing (discussed in Section 3.4)

Use of the import facility subsequently returns the user to the main menu.

Use of the "Select Database for Viewing" facility leads the user subsequently to the third level screen and menu where selection of the set of requirements to be viewed can be made. (discussed in Section 3.5).

This leads the user to the fourth level of screen where the selected requirements can be viewed as discussed in Section 3.6.



### 3.2. The Requirements Database Main Menu

When the database is opened the initial, Requirements Database Main Menu is displayed.

The functions of the menu are selected by clicking the left mouse button on one of the options. The following options are available on the opening menu :-

- Import New Data
- Select Database for Viewing
- Close Application

The first two functions are explained in detail below.



### 3.3. Import New Data

The option 'Import New Data' allows the user to populate a requirements database. This can be a newly created database or an update to a database with, for example, requirements from a new version of a SARPs. The 'Import New Database' form has the following format:

The screenshot shows a window titled "Requirements Database" with a sub-header "Import New Database". The form contains three text input fields with the following labels: "Enter the name of the new database file including the full path.", "Enter a description of the database:", and "Enter location of original SARPs document file including the full path:". Below these fields is a note: "Note:- To Import additional data into an existing database first select the database name using the record selection bar below and then begin the import." There are two buttons: "Begin Import" (with a downward arrow icon) and "Close Form" (with a leftward arrow icon). At the bottom of the window, there is a record navigation bar showing "Record:13 of 3" and various navigation icons.

The databases are populated with data created by requirement extraction during an earlier process (see Section 4).

The 'Import New Data' form has three fields to be filled by the user before the import process begins. The first field to be entered is the name of the newly created database to be populated. A description of the database, to appear on the viewing application forms is then entered. The third field to be completed is the location of the Word format file containing the original SARPs document. To import data from a SARPs into a new database, identify the path name of the database file and of the source document and then click on the 'Begin Import' button.

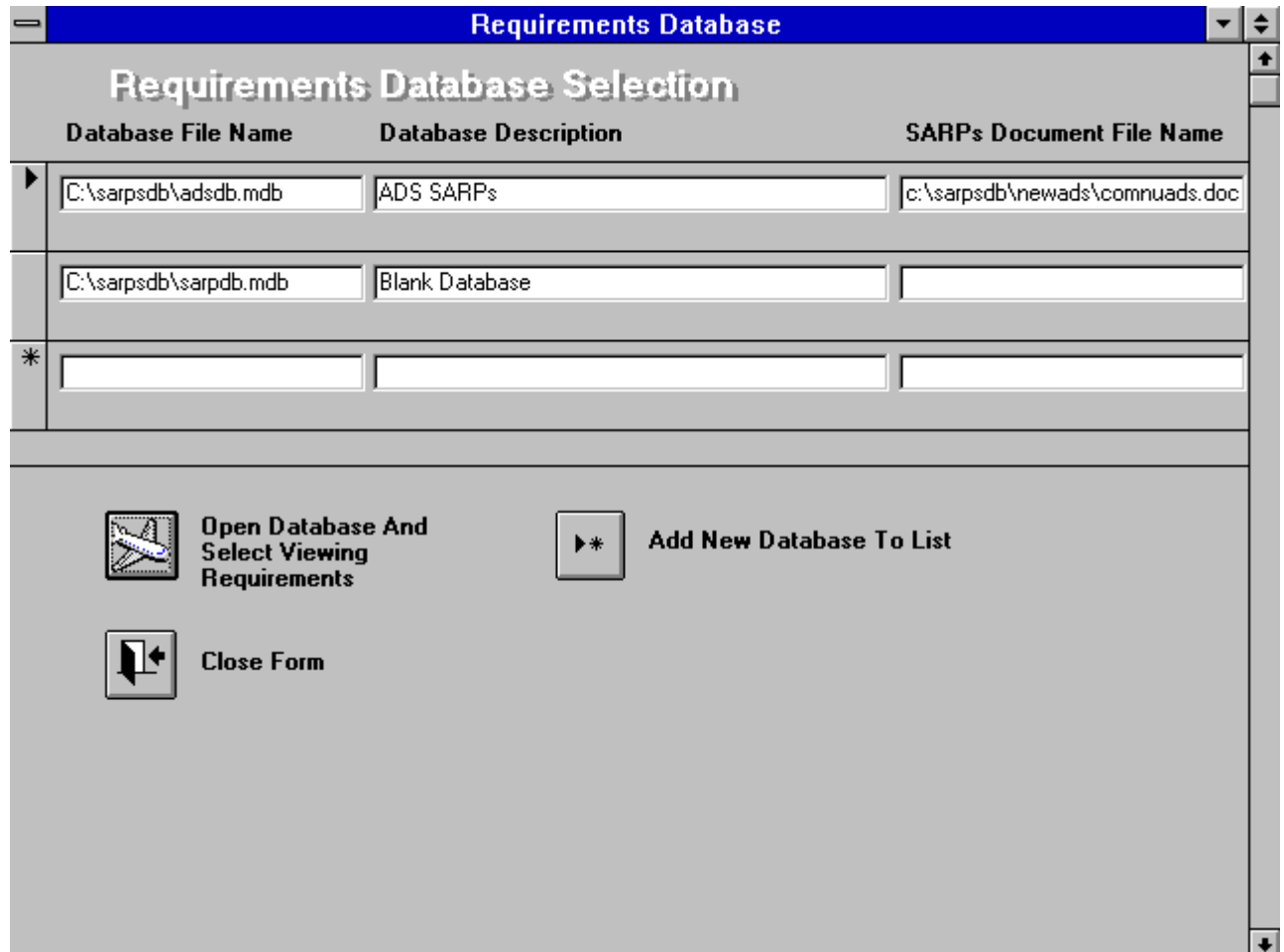
To import data from a new version of a SARPs into an existing database, select the appropriate database on the screen using the record navigation bars at the bottom of the screen and then click on the 'Begin Import' button.

When the data has been successfully imported into the database, the user is returned to the main menu. Requirements can be viewed through the "Select Database for Viewing" option on the main menu.



### 3.4. Select Database for Viewing


Clicking on the option 'Select A Database For Viewing' allows the user to load a requirements database for a particular SARPs.

The user is presented with the Requirements Database Selection screen (shown below). Here, the user is given a list of available requirements databases to choose from. To choose a requirements database click on the record selection bar to the left of the database file name, and then click on the 'Open Database And Select Requirements For Viewing' control button.



	Database File Name	Database Description	SARPs Document File Name
▶	C:\sarpsdb\adsdb.mdb	ADS SARPs	c:\sarpsdb\newads\comnuads.doc
	C:\sarpsdb\sarpdb.mdb	Blank Database	
*			

 **Open Database And Select Viewing Requirements**       **Add New Database To List**

 **Close Form**

Once a database has been selected, the 'Select viewing requirements' form is opened. The 'Select Viewing Requirements' form will now display the name of the currently selected requirements database.

### 3.5. Select Requirements for Viewing

The 'Select Viewing Requirement' form allows the user to select all or a sub-set of the requirements available in the database selected above. The form has the following format:

Requirements Database

Select Requirements For Viewing

SARPs Database ADS SARPs

Select SARPs version   Type 'All' To View Requirements From All Versions

View All Requirements (for selected SARPs)

View Requirements With Subrequirements (for selected SARPs)

View Requirements With No Subrequirements (for selected SARPs)

View Validated Requirements (for selected SARPs)

View Non Validated (for selected SARPs)

View Categorised Requirements (for selected SARPs)

View Non Categorised Requirements (for selected SARPs)

View Delta Comparison (for selected SARPs)

Close Form

The options available to select subsets of requirements data are as follows:

- Select SARPs Version (all versions or a specific one)
- View All Requirements (for selected SARPs)
- View Requirements With Subrequirements (for selected SARPs)
- View Requirements With No Subrequirements (for selected SARPs)
- View Validated Requirements (for selected SARPs)
- View Non Validated Requirements (for selected SARPs)
- View Categorised Requirements (for selected SARPs)
- View Non Categorised Requirements (for selected SARPs)
- View Delta Comparison (for selected SARPs) - see below.

These options allow the user to select a subset of the requirements to view when the requirements viewer is opened. To select an option click on the appropriate control button to the left of the subset description. The select SARPs version option displays a drop down list box of available versions to choose from. The select SARPs version option can be used in conjunction with any other option.

Once the required option is selected, the requirements viewing form is automatically opened (see below). This allows the requirements to be viewed and analysed in the format specified by the selected viewing option.

The 'View Delta Comparison' option performs a comparison of requirements for two versions of a SARPs. For example version 1.0 and version 2.0 of a SARPs can be compared. The comparison is based on the shall id's of the requirements. Any

requirements that appear in the first version of the SARPs but not in the second version will be displayed by the 'Delta Comparison'. The first version of the SARPs is chosen using the 'Select SARPs Version' list box. The second version of the SARPs is chosen using the 'View Delta Comparison' check box. The delta comparison can then be initiated by clicking on the 'View Delta Comparison' control button.

### 3.6. The Requirements Viewing Form

#### 3.6.1. General

This is the principal form of the Requirements Database.

When the viewing options have been selected from the 'Select Requirements For Viewing' form the requirements viewing form (shown below) itself is opened. In this form the user can view detailed information on the selected requirements stored in the database.

**Requirements Database**

**Requirement Details** SARPs Database:  Version:

Shall ID:  Section:  Position:

**Requirement Text** Systems developed to support ADS functionality shall ([1]) meet the Required Communications Performance (RCP) presented in table 1-1.

**Supporting text:**

**Status** Status:   **Description:** The database entry is the current entry and is neither replaced by another or deleted.

Replaced By:

**Category** System Category:   All Systems

**Validation** Validation State:   Test number:

Test Specification ID:  Test Result ID:

**Find Shall**   
**Find Text**  
**Link To Word**  
**Print Report**  
**Print Screen**  
**Print Annotations**

**Relationships**   Sons

**Supporting Information**   Annotations   Objects

Record: 1 of 704

Standard Access navigation functions are available. They can be used to access any record in the database. e.g. next, previous, last (See section 3.6.9. 'Additional Controls').

To navigate between the fields in the forms either use the mouse, you can click in any field in the form to make it current, or use the following keys :-

Press	To
Tab or Enter	Move to the next field.
Shift+Tab	Move to the previous field.

Ctrl+Shift+Home	Move to the first field in the form.
End	Move to the last field in the current record.
Ctrl+End	Move to the last field in the last record.
Home	Move to the first field in the current record.
Ctrl+Home	Move to the first field in the first record.
Ctrl+Page Down	Move to the current field in the next record.
Ctrl+Page Up	Move to the current field in the previous record.

The Find Shall and Find Text functions are available to search for specific records (See section 3.6.9. 'Additional Controls').

User updateable fields appear with a white background on the form. Non updateable fields appear with a grey background.

The requirements data displayed in the forms in the viewing application system can be printed. To print a screen dump of the current requirement click on the 'Print Screen' button on the 'Requirement Details' form.

To print the requirements data in the form of a report the 'Print Report' button can be used. This button opens a form to allow a subset of requirements to be printed in a report format. The form gives the option to print requirements by System Category, Test Number or Validation State. Note the printing subset is itself a subset of any options chosen on the 'Select Viewing Requirement ' form e.g. view version 0.4 requirements only.

To print the annotations associated with a particular requirement use the 'Print Annotations' button. This report prints a summary of the requirement along with the associated annotations.

The requirements viewing screen is divided into the following eight sections as discussed below.

### 3.6.2. The Header area of the screen

The Header area of the screen displays details of the selected database and the version of the SARPs from which the displayed requirements were selected. The data in the Header is not modifiable in the viewer.

### 3.6.3. The Requirement area of the screen

The Requirement area of the screen displays details of the displayed requirement. The details in question are discussed below.

- the original 'id' of the requirement
- the section within the SARPs document
- the position of the requirement within the SARPs document
- the requirement text
- supporting text.

Supporting text can be inserted into the database by 'Cutting and Pasting' from the Word format SARPs document. To 'Paste' the selected data into the 'Supporting Text' field click anywhere within the field and then press the SHIFT + INSERT keys simultaneously.

The data in the Requirements area is not modifiable in the viewer except that the supporting text can be "cut and pasted" from the source SARPs document.

### 3.6.4. Status area of the screen

This section displays the status of the requirement. The valid statuses are 'Current', 'Deleted', 'Replaced'. If the requirement is marked as replaced then the 'Replaced by' field can be used to identify the requirement that replaced it. Generally this feature is used to identify requirements when a later version of a SARPs has been created.

This area of the screen is manually updated

### 3.6.5. Category area of the screen

This section displays manually applied "applicability" of the requirement in terms of whether it applies to an Air and/or Ground system.

This area of the screen is manually updated

### 3.6.6. Validation area of the screen

This section displays the manually applied validation status of the requirement and reflects the results, if any, of the validation test programme. Provision also exists to manually record details of the relevant test identity and associated test document.

The requirements database provides a mechanism to identify those requirements that have been validated. Requirements that have not been validated can be identified through the 'View Non Validated Requirements' menu option on the 'Select Requirements For Viewing' form. In this mode only non validated requirements are displayed by the viewing application. This allows non validated requirements to be identified and processed quickly. A similar viewing function will list requirements that are validated.

A requirement can only be set to validated if all of its sub-requirements (see section 3.6.7.) have been set to validated. When a requirement is to be marked as validated a check is made by the application that no sub-requirements exist with an incomplete validation status. If any such sub-requirements do exist then the parent requirement cannot be marked as validated.

### 3.6.7. Relationships area of the screen

This section displays information on related requirements. This area of the screen is manually updated.

The requirements extracted from the SARPs document may be manually consolidated when they have been imported into the database. Consolidation refers to the establishment of links and relationships between requirements. Relationships are set between requirements to model a number of situations (See Relationships).

To identify requirements that have no relationships defined the 'View Requirements with no subrequirements' option is provided through the 'viewing options' on the menu system. Using this system non consolidated requirements can be identified and processed.

The number of subrequirements associated with the requirement are displayed along with control buttons to view or edit them. Subforms are used to display the list of subrequirements. If the complete list of requirements is too large to fit into the subform window then a scroll bar appears to allow the user to scroll through all the requirements. The subform allows the user to update old and define new relationships.

If the requirement currently being viewed has a parent requirement, then a button is displayed identifying the parent. Clicking on the button causes the application to jump to the parent requirement.

### 3.6.8. Supporting Information area of the screen

This section displays information which has either been manually annotated against the requirement or where supporting tables, diagrams and the like have been copied from the source document into the database. This area of the screen is manually updated.

The number of annotations and objects associated with the requirement are displayed along with buttons to view or edit the annotations and objects.

Note:- Before an object can be inserted into the database it must have been 'Cut' from the Word Document. The Word and Access applications can be switched between by holding down the 'Alt' key and then pressing the 'Tab' key. The control button 'Insert Object' is available on the 'Objects' form to 'Paste' the object from the Word document. The 'Insert Object' button performs the MS Access 'Paste Special' function, this allows a link to be created between the objects in the database and the SARPs.

Annotations contain user's comments on database entries. The entries are informal in that they may be edited at will by any user. They may be used to collect early defect report input material or simply insert personal comments.

The View or Amend Annotations form displays all the annotations related to the current database item. Annotations appear in the order they were entered in the database.

A new annotation may be inserted by clicking in the empty cell at the bottom of the current list of annotations. The date is set by default to the current date. The 'By' field is available to record the initials of the user making the annotations.

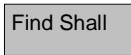
It has been assumed that one central master copy of the database will be administered. Any annotations made against requirements should be made in this database.

If users of secondary databases wish to exchange their annotations with other users then this should be done through the central database. These can then be distributed to secondary copies of the database. This is a manual operation.

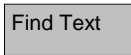
Any annotations made against secondary copies of a database will be for the personal use and will not be distributed.

### 3.6.9. Additional controls on the screen

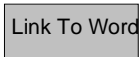
The footer contains additional control buttons to access functions of the application. The available functions are displayed in the table below.



To find a requirement using its shall id, type the shall id in the box to right of the 'Find Shall' text and press the enter key. This will automatically display the correct requirement.



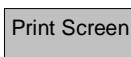
This button opens a dialogue box to allow the user to find a specific requirement based on the data in any field. The dialogue box is the standard Access find function. The options should be set to search all fields and any part of the field. The match case option can also be set.



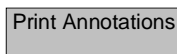
This button locates a specific requirement into the SARPs text. It starts the Winword application, opens the corresponding file and locates the requirement.



This button opens a form to allow a subset of requirements to be printed in a report format. The form gives the option to print requirements by System Category, Test Number or Validation State. Note the printing subset is itself a subset of any options chosen on the 'Select Viewing Requirement' form e.g. view version 0.4 requirements only.



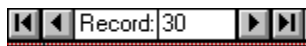
This button prints a screen dump of the currently displayed requirement.



This button prints a summary of the requirement and all annotations associated with the requirement.



This button closes the current viewing window and returns the user to the main menu.



Standard Access browsing buttons.

First record    Previous record    Next record    Last record



## 4. PROCESSING THE SARPs DOCUMENT.

### 4.1 Overview

The editors of a SARPs do not necessarily provide a unique reference for each requirement contained in the SARPs. Thus, the SARPs has to be subject to some processing so that each requirement can be identified and then loaded into the database.

Processing the SARPs document involves numbering the 'Shall' statements in the document, extracting the numbered 'Shall' statements' and then importing the extracted data into a new database. The overall process of creating a requirements database from a SARPs is as follows.

The Word for Windows application is executed and the SARPs document is loaded.

A macro (numshall2) is executed to assign identification numbers to the 'Shall' statement (see 'the 'shall' identifier macro' section).

**Note:-** During the execution of the 'numshall2' macro, if 'Shall' numbers have not been previously assigned to the requirements then the following message is displayed :-

"NOTE :- This process will number (or renumber) all 'Shalls' in the document. Are you confident that this version is not already numbered and loaded in the database ?"

This allows the user abort the macro if they are in any doubt about the numbering process. Any change to an existing requirement should renumber only this changed requirement and result in a later version of the SARPs.

The 'Shall' extraction macro (findshall2) is then executed to extract the 'Shall' statements and the section headings of the statements (see 'the requirement extraction macro').

When the extraction macro has finished a message is displayed giving confirmation of completion.

The user must then exit Word for Windows and manually create a copy of the master database to hold the extracted requirements. A new database can be created by copying the standard requirements database file SARPDB.MDB to a new file e.g. ADSDB.MDB for the ADS SARPs requirements. ( This can be done using MS DOS or Windows File Manager, the SARPDB.MDB file is located in the same directory as the viewing application).

The final step is to import the data into the newly created database from the temporary files created in by the macros. This is achieved by selecting 'Import a new database' in the main menu of the Requirements Database. (see The requirements database main menu)

**Note :-** The loading of macros into the macro set within Word is discussed in the Installation section.

### 4.2 The 'Shall' Identifier Macro

To execute the 'Shall' identifier macro first choose 'macro' from the Word 'tools' menu and then select 'numshall2' from the available list of macros.

The 'Shall' identifier macro (numshall2) is used to automate the process of assigning identifiers to 'Shall' statements. The 'Shall' numbers that the macro generates are stored as hidden text in the SARPs document.

The 'Shall' statements are numbered sequentially e.g. 1,2,3,4. The 'Shall' identification numbers of deleted shall statements cannot be reused in later versions of the SARPs. This allows different version of the SARPs documents to be compared. When new 'Shall' statements are added to later versions of a SARPs, the 'Shall' identification numbers

assigned to the new statements will be higher than the previously highest value assigned to a 'Shall' statement in any earlier versions of the SARPs.

**Note:-** The SARPs must be stored in one file as a complete document, not as a number of separate files. When the macro is executed it checks if any of the 'Shall' statements in the SARPs document have already been given identification numbers. If numbers have been previously allocated then the highest 'Shall' number is located and stored.

If identification numbers have not been previously allocated in the SARPs document then the 'initial' number will be set to 1, this is the identification number to be assigned to the first 'Shall' statement.

The user is then asked if they want to number all the 'Shall' statements without stopping. If the user clicks on 'yes' then the macro will go through all the 'Shall' statements in the SARPs, assigning identifiers based on the 'initial' and highest values.

If the user answers 'no' then 'Shall' identification numbers are not assigned automatically. A suggested number is given to the user along with the option to set their own replacement value if required. After each individual 'Shall' statement has been given an identifier then a choice is given to continue or stop the numbering process. This option is provided in case the word 'shall' appears in the document but is not a 'Shall' statement.

The suggested 'Shall' identification number value is based on a number of factors. If 'Shall' identification numbers have not been previously allocated to the SARPs document then the suggested value will be based on the 'initial' number given by the user.

If 'Shall' identification numbers have been previously allocated to any requirements in the document then the macro will suggest a value for unnumbered requirements as follows. The macro will base the value on the highest value already used to number a 'Shall' in the SARPs incremented by one.

If the unnumbered requirement is not enclosed by two numbered requirements e.g. if it appears after all numbered requirements in the document, then the suggested value will be the highest identification number currently in use in the document incremented by one.

### **4.3 The Requirement Extraction Macro**

To execute the requirement extraction macro first choose 'macro' from the Word 'tools' menu and then select 'findshall2' from the available list of macros.

The requirement extraction macro (findshall2) should be executed after the 'Shall' identification process has been completed. It is selected manually whilst viewing the Word for Windows version of the SARPs.

When executed the macro first identifies the version of the SARPs document. The version of the document is displayed in a dialogue box along with a choice to accept the version or input a replacement piece of text.

After the version has been identified, the macro descends through the SARPs document searching for the word 'Shall'. When an occurrence of the word 'Shall' is identified then the encapsulating sentence is extracted. The 'id' of the 'Shall' statement which identifies the requirement is extracted from this sentence. The section heading of the enclosing section of text is then identified and extracted. This data is then written to a temporary file (tempshal.txt) along with a counter to identify the order in which the statements appeared in the document.

## **4.4 Importing the Extracted Data**

To import the extracted data the user must first open the database viewing application 'VIEWSARP.MDB' from MS Access. The menu option 'Import New Data' can then be chosen to start the import process, this opens a form where the user can enter details of the data to be imported

The 'Import New Data' form has three fields to be filled by the user before the import process begins. The first field to be entered is the name of the newly created database to be populated. A description of the database, to appear on the viewing application forms is then entered. The third field to be completed is the location of the Word format file containing the original SARPs document. When the fields have been set then the import can proceed by clicking on the 'Begin Import' button.

The 'Import New Data' form can also be used to import requirements from different versions of SARPs. The form can be used to import the requirements for a new version of a SARPs into an existing database containing requirements from an earlier version of the SARPs. To import a new version of requirements the database containing the old version of the requirements must be selected. This can be achieved by clicking the mouse pointer on the record navigation bar at the bottom of the screen until the appropriate database is displayed on the form. When the database information is displayed then the import can proceed by clicking on the 'Begin Import' button.

## **A. APPENDIX A: GUIDE TO THE EDITORS**

### **A.1. General**

For the purpose of validation, SARPs are viewed as a statement of a series of requirements, each identified as a “Shall” statement. The “Shall” statements are extracted from the SARPs and loaded into a database so that a means is provided to support the validation of the SARPs.

Each requirement must be given a unique identity so that the process of validation can be executed in an auditable and repeatable way. However, it is presumed that when a SARPs is first issued by its editor for validation, the “Shall” statements will not contain anything that uniquely identifies each in turn.

### **A.2. Processing newly issued SARPs**

A means is provided to append a unique reference to each occurrence of the word “Shall” in a SARPs. This is used by a “central authority” concerned with maintaining a database of requirements in support of the validation of the SARPs. Tools are provided to effect this process. However, it is important for editors to note that:

- (i) The annotation (numbering) of ‘Shall’ statements is carried out by the ‘Shall Identifier’ Word Macro.
- (ii) The SARPs document has to be consolidated into one complete document to execute the extraction macros, even if the source was in several parts.
- (iii) The resulting annotation of ‘Shalls’ is maintained in the SARPs document as hidden text.

The result of the process is that each “Shall” is modified in the SARPs with the addition of a unique number in square brackets to the word “Shall”. The reference is contained as hidden text within the processed SARPs. It is anticipated that the processed SARPs would be passed back to the editor to provide a baseline for any subsequent development and modification of the SARPs.

### **A.3. Processing amended SARPs**

If the overall process of SARPs validation is to be effective, any amendment by editors to a processed SARPs must result in a new “shall” statement without any unique reference. Thus, any change to a requirements in a SARPs, no matter how minor, must result in a “new” shall statement i.e. one without a unique reference. This means that where existing shall statements are modified the unique reference must be removed and a new one added. This can be carried out by the “central authority” discussed above but only if details of amendments to existing shall statements are clearly annotated by the editor when the SARPs is re-issued. A similar requirement applies where a new requirement is added to the SARPs.

Thus editors should be aware that:

- (i) Once ‘Shalls’ have been annotated (numbered) any change to the requirement requires production (by the Author of the SARPs) of a new ‘Shall’ without an annotation. i.e. it is not acceptable to change the wording of a ‘Shall’ statement as this retains the original ‘Shall’ number, FURTHER, it is not acceptable to cut and paste the associated, original annotation.
- (ii) The ‘Shall’ statements are initially numbered sequentially e.g. 1,2,3,4. However, the ‘Shall’ identification numbers of deleted shall statements cannot be reused in later

versions of the SARPs. This allows different version of the SARPs documents to be compared.

(iii) When new 'Shall' statements are added to later versions of a SARPs, the 'Shall' identification numbers will be automatically assigned by the 'Shall' identification macros. The new statements will be assigned higher numbers than the previously highest value assigned to a 'Shall' statement in any earlier versions of the SARPs.

(iv) When SARPs are re-issued, any changes to the earlier version should be clearly identified. This is easily effected if the editor uses the facility in Word to Mark Revisions BEFORE commencing any sequence of editing.