

FANS1/A Performance Based Communications and Surveillance On-Line Analysis Tool



**ICAO Africa and Latin America Regional Offices
Operational Data Link Seminar
8-11 August 2016
Accra, Ghana**



What we will cover today

- **The need for on-line analysis tool.**
- **Overview, access, and development status.**
- **Discussion around availability/access/licencing.**
- **Description of functionality.**
- **On-line demonstration.**



- Airways has been carrying out manual analysis of CPDLC and ADS-C data since 2009 using Excel spreadsheets supplemented by occasional analysis using the FAA supplied GPAT tool.
- This manual analysis is very time consuming and resource intensive.
- Airways has developed an on-line application which will provide stakeholders the means to efficiently extract ADS-C RSP180 and RSP400 performance and CPDLC RCP240 and RCP400 performance .
- The tool allows the import and performance analysis of .csv files for CPDLC and ADS-C as described in the guidance material (ICAO Doc

- **The on-line application has been designed to be used by any stakeholder:**
 - **It allows the aggregation of regional data.**
 - **It allows for separate databases for different regions.**
- **The tool provides performance data in both graphical format (cumulative frequency distributions) and in tabular form.**
- **The software development of the initial production version has now been completed and is undergoing final testing and validation.**
- **Access to the tool is via:**

<https://pbcsanalysis.herokuapp.com/>



- **The on-line analysis tool is hosted on the Heroku cloud application platform which is used by many organizations to deploy and operate applications.**
- **Heroku focuses on infrastructure management, scaling, and security.**
- **Heroku's physical infrastructure is hosted and managed within Amazon's secure data centers and utilize the Amazon Web Service (AWS) technology.**
- **Amazon data centre operations have been accredited under:**

ISO 27001

SOC 1 and SOC 2/SSAE 16/ISAE 3402

PCI Level 1

FISMA Moderate

Sarbanes-Oxley (SOX)



Providing access to the tool

- **We are still discussing internally how the tool can be made available to other interested ANSP or other stakeholders in the FANS1/A community that need access to the performance data.**
- **A possible solution if we receive any interest is to licence use for a free “trial” period such as 6 months to enable those interested to have a reasonable time to assess the tool.**
- **Following the trial period we anticipate that a small licence fee will be required to cover maintenance, and web-site charges.**



Overview Page

PBCS Analysis



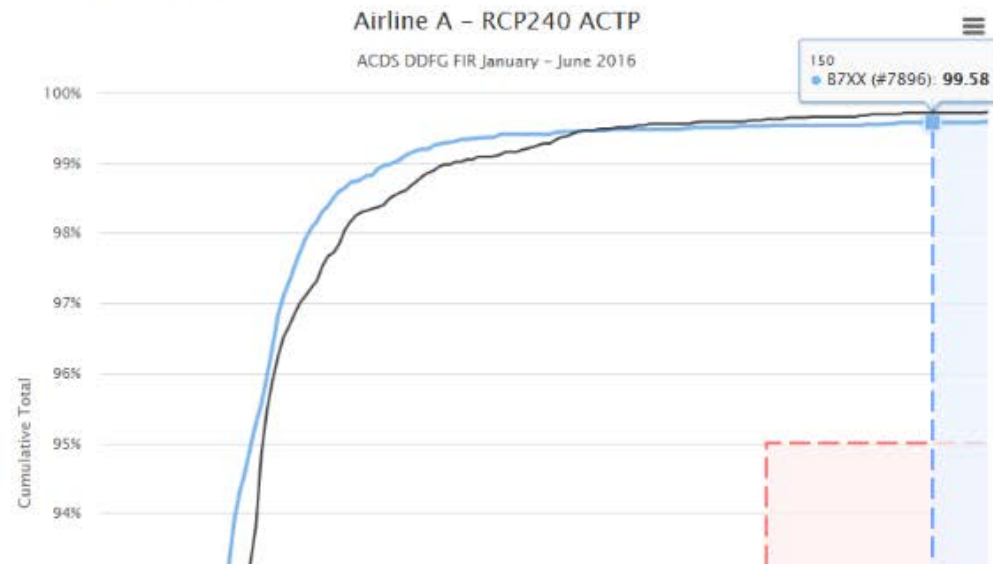
Performance Based Communications and Surveillance (PBCS) analysis

This website enables the analysis of ADS-C and CPDLC data that has been extracted in accordance with the guidelines in ICAO Performance Based Communications and Surveillance Manual Doc 9869 Appendix D

You must be an authorized user to access this website. For further information contact paul.radford@airways.co.nz

Log on


Example reports




Log on

Log on



 You must have a user account to access this website


 Username:

Password:

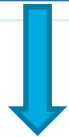
[Lost password?](#)




Paul Radford

 Username: paul

Email Address: paul.radford@airways.co.nz



Edit Username : paul

 First Name:

Last Name:

Email Address:

Password:

Confirm:

- Your password can't be too similar to your other personal information.
- Your password must contain at least 8 characters.
- Your password can't be a commonly used password.
- Your password can't be entirely numeric.



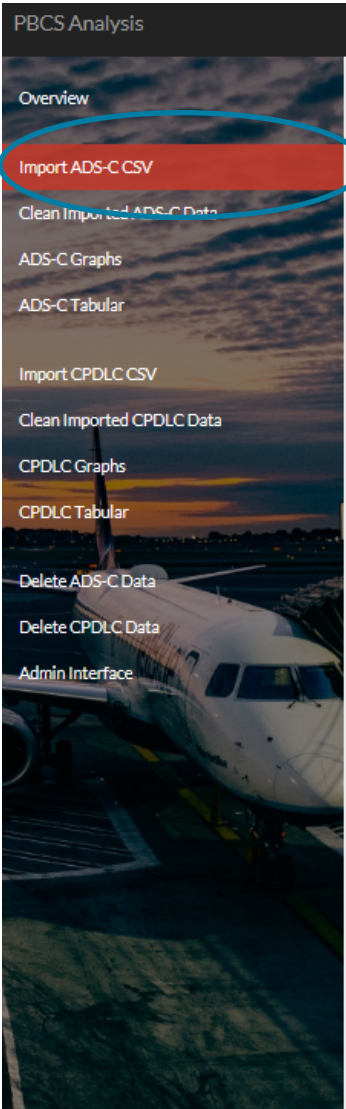
After entering your username and password the menu items allowed by your user permissions are displayed in the menu bar.

PBCS Analysis

- Overview
- Import ADS-C CSV
- Clean Imported ADS-C Data
- ADS-C Graphs
- ADS-C Tabular
- Import CPDLC CSV
- Clean Imported CPDLC Data
- CPDLC Graphs
- CPDLC Tabular
- Delete ADS-C Data
- Delete CPDLC Data
- Admin Interface

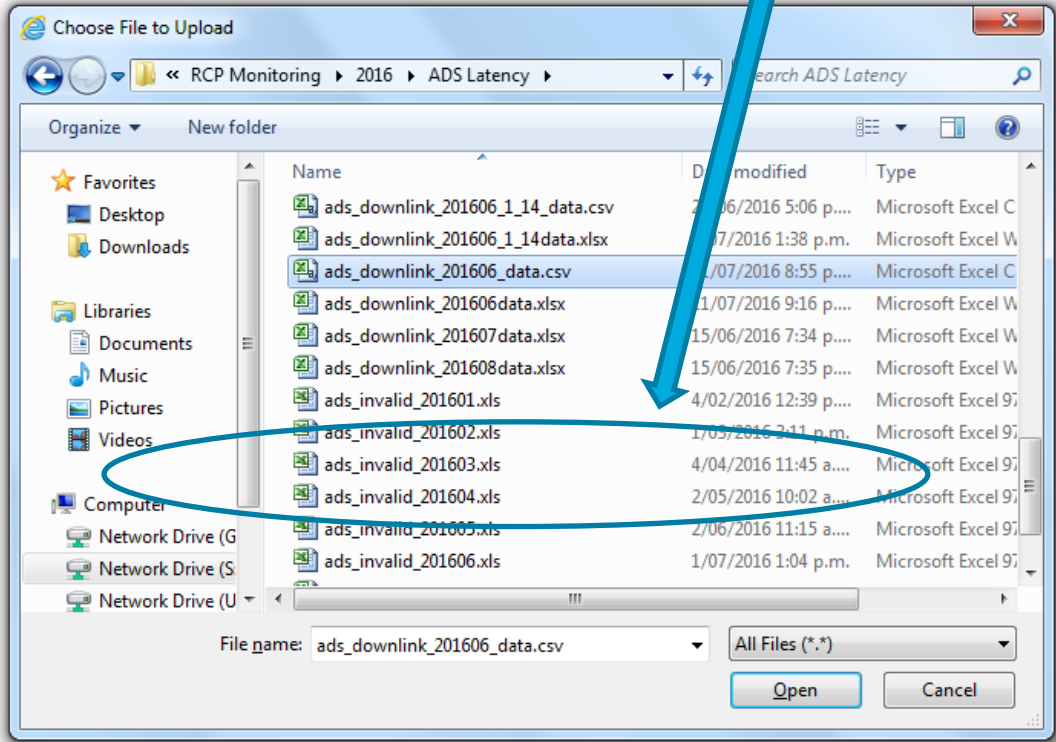


Importing .csv data



Import Data

Select CSV File to upload:



Importing .csv data

PBCS Analysis

- Overview
- Import ADS-C CSV**
- Clean Imported ADS-C Data
- ADS-C Graphs

Import Data

Select CSV File to upload:

IS:\FANS1A\RCP Monitoring\2016\ADS Latency\ads_c ... Browse... **Import**

PBCS Analysis

- Overview
- Import ADS-C CSV
- Clean Imported ADS-C Data
- ADS-C Graphs
- ADS-C Tabular
- Import CPDLC CSV

Importing CSV Data

5500 of 46651 records loaded

Time to completion : 2 minutes 29 seconds


PBCS Analysis

- Overview
- Import ADS-C CSV
- Clean Imported ADS-C Data
- ADS-C Graphs
- ADS-C Tabular
- Import CPDLC CSV
- Clean Imported CPDLC Data
- CPDLC Graphs
- CPDLC Tabular

Importing CSV Data

46651 of 46651 records loaded

Time to completion : 0 minutes 0 seconds

 Please Wait - Tidying imported data...

Clean/Filter imported data

- Shows all imported data , user can sort, review , and view invalid records that will be discarded.
- User can fix missing type/company for any tail number.
- Find and designate bad tails and outages.



23	NZZO	UAE	A388	A6EDO	20160601	XXA	-37.256699	170.670029	W	00:35:13	00:35:21	8	NORMAL	SAT
24	NZZO	ANZ	B772	ZKOKG	20160601	MTS1	-22.470646	-161.346756	P	00:36:46	00:36:56	10	NORMAL	SAT
25	NZZO	RNZAF	C120	NZ7005	20160601	XXP	-29.682514	171.903595	P	00:37:05	00:37:15	10	NORMAL	SAT

Showing 1 to 25 of 46,651 entries

Previous **1** 2 3 4 5 ... 1867 Next

Find Outages/Bad-Tails

Duration Range :



From Line (Click):

To (Alt-Click):

Set Outage

Selected Tail:

To (Ctrl-Click):

Set Bad Tails

Fix missing AC Type/AC Company

Tail Number:

AC Type:

AC Company:

Set missing values

Invalid data to be discarded

Show entries

Search:

Line	ATSP	AC Company	AC Type	Tail No	Date	RGS	Latitude	Longitude	Report Type	Aircraft Time	OCS Time	Duration	Designation	RGS type
No data available in table														

Showing 0 to 0 of 0 entries

Previous Next



Copy Imported Data to Main Database

Search:

Report Type	Aircraft Time	OCS Time	Duration	Designation	RGS type
P	02:58:33	02:59:01	28	NORMAL	SAT
P	03:12:30	03:12:45	15	NORMAL	SAT
W	03:18:04	03:18:11	7	NORMAL	SAT
P	03:19:53	03:20:00	7	NORMAI	SAT

Copy Imported Data to Main Database



Once you have finished correcting and errors you may copy this data to the main database.

Are you sure you wish to proceed?

Copy data

Continue cleaning data

Downlink Delay Analysis

Overview

Import ADS-C CSV

Clean Imported ADS-C Data

ADS-C Graphs

ADS-C Tabular

Import CPDLC CSV

Clean Imported CPDLC Data

CPDLC Graphs

Delete ADS-C Data

Delete CPDLC Data

Admin Interface

Data Transfer Complete



All data transferred from Import table to Main database.

Moved 33453 records.



ADS-C Graphical Analysis Page

PBCS Analysis Profile

Overview

Import ADS-C CSV

Clean Imported ADS-C Data

ADS-C Graphs

ADS-C Tabular

Import CPDLC CSV

Clean Imported CPDLC Data

CPDLC Graphs

CPDLC Tabular

Delete ADS-C Data

Delete CPDLC Data

Admin Interface

Graphical Data Selection

Series Name <input type="text" value="Series"/>	Aircraft Company <input type="text"/>	Aircraft Type <input style="float: right; color: red;" type="text"/> ✕
Designation <input type="text" value="✕NORMAL ✕"/>	ATSP <input type="text"/>	Tail Number <input style="float: right; color: orange;" type="text"/> ↻
	Media Type <input type="text" value="All"/>	RGS <input type="text"/>

+ Add new graph↻ Reload all graphs

Date From <input style="width: 100%;" type="text" value="2016-01-01"/>	Date To <input style="width: 100%;" type="text" value="2016-12-31"/>	
Chart Minimum Percentage <input type="text" value="90"/>	Chart Minimum Time (sec) <input type="text" value="240"/>	RSP <input style="width: 100%;" type="text" value="RSP180"/>
Chart Title <input type="text" value="Title"/>	Sub-title <input type="text" value="Chart Sub-title"/>	

1 Select date range “Date From” – “Date To”; RSP - select RSP180 or RSP400 analysis. Select “Chart Minimum Percentage” = Y Axis ; Chart Minimum Time (sec) = X Axis. Enter “Chart Title”; Sub-title.

ADS-C Graphical Analysis Page

- Overview
- Import ADS-C CSV
- Clean Imported ADS-C Data
- ADS-C Graphs
- ADS-C Tabular
- Import CPDLC CSV
- Clean Imported CPDLC Data
- CPDLC Graphs
- CPDLC Tabular
- Delete ADS-C Data
- Delete CPDLC Data
- Admin Interface

Graphical Data Selection

Series Name	<input type="text" value="Series"/>	Aircraft Company	<input type="text"/>	Aircraft Type	<input type="text"/>	
				Tail Number	<input type="text"/>	
Designation	<input type="text" value="×NORMAL ×"/>	ATSP	<input type="text"/>	RGS	<input type="text"/>	
		Media Type	<input type="text" value="All"/>			

Date From: Date To:

Chart Minimum Percentage: Chart Minimum Time (sec): RSP:

Chart Title: Sub-title:

Enter “Series Name” for this graph and then select from “Aircraft Company” “Aircraft Type” “Tail Number” “RGS Type” “RGS” and “ATSP”.

selecting this button calculates the graph and when a is displayed, selecting deletes the graph

ADS-C Graphical Analysis Page

PBCS Analysis Profile

Overview

Import ADS-C CSV

Clean Imported ADS-C Data

ADS-C Graphs

ADS-C Tabular

Import CPDLC CSV

Clean Imported CPDLC Data

CPDLC Graphs

CPDLC Tabular

Delete ADS-C Data

Delete CPDLC Data

Admin Interface

Graphical Data Selection

Series Name <input type="text" value="Series"/>	Aircraft Company <input type="text"/>	Aircraft Type <input style="float: right; text-align: right;" type="text"/> ×
Designation <input type="text" value="×NORMAL ×"/>	ATSP <input type="text"/>	Tail Number <input type="text"/>
	Media Type <input type="text" value="All"/>	RGS <input style="float: right; text-align: right;" type="text"/> ↻

+ Add new graph4

↻ Reload all graphs5

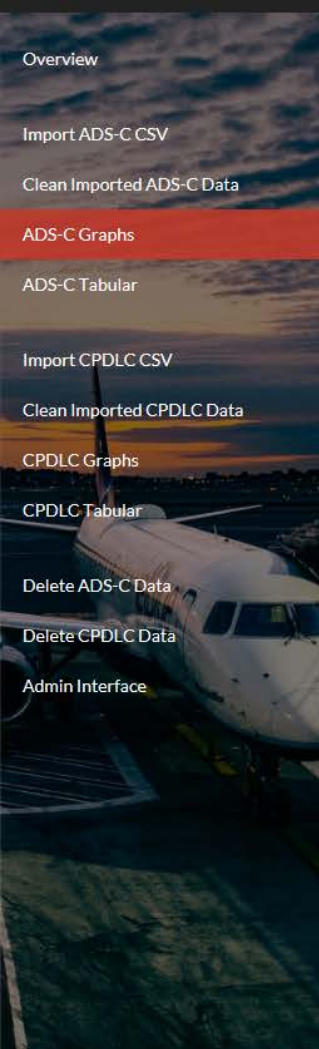
Date From <input style="width: 100%;" type="text" value="2016-01-01"/>	Date To <input style="width: 100%;" type="text" value="2016-12-31"/>	
Chart Minimum Percentage <input type="text" value="90"/>	Chart Minimum Time (sec) <input type="text" value="240"/>	RSP <input style="width: 100%;" type="text" value="RSP180"/>
Chart Title <input type="text" value="Title"/>	Sub-title <input type="text" value="Chart Sub-title"/>	

4 Selectir + Add new graph adds a new graphical data selection area.

5 Select ↻ Reload all graphs if changing a date range or other selection field to reload all graphs selected.



ADS-C Graphical – Building a Graph



Graphical Data Selection

1st graph selection

Series Name: ANZ B77W
RGS Type:

Aircraft Company: × ANZ
Tail Number:
ATSP: × NZZO

Aircraft Type: × B77W
Designation: × NORMAL ×

2nd graph selection

Series Name: ANZ B772
RGS Type:

Aircraft Company: × ANZ
Tail Number:
ATSP: × NZZO

Aircraft Type: × B772 |
B772
B77W
B789

Date From: 2016-01-01
Date To: 2016-06-30

Chart Minimum Percentage: 90
Chart Minimum Time (sec): 240

Chart Title: ANZ RSP180 NZZO FIR
Sub-title: Jan - June 2016

Aircraft Type pulldown filters the types (B772, B77W, B789) for the selected Aircraft Company (ANZ) automatically

ANZ RSP180 NZZO FIR
Jan - June 2016

100%



ADS-C Graphical – Building a Graph

Graphical Data Selection

Series Name	<input type="text" value="ANZ B77W"/>	Aircraft Company	<input type="text" value="×ANZ"/>	Aircraft Type	<input type="text" value="×B77W"/>	<input type="button" value="×"/>
RGS Type	<input type="text"/>	Tail Number	<input type="text"/>	Designation	<input type="text" value="×NORMAL"/>	<input type="button" value="×"/>
		ATSP	<input type="text" value="×NZZO"/>			<input checked="" type="checkbox"/>

Series Name	<input type="text" value="ANZ B772"/>	Aircraft Company	<input type="text" value="×ANZ"/>	Aircraft Type	<input type="text" value="×B772"/>	<input type="button" value="×"/>
RGS Type	<input type="text"/>	Tail Number	<input type="text"/>	Designation	<input type="text" value="×NORMAL"/>	<input type="button" value="×"/>
		ATSP	<input type="text" value="×NZZO"/>			<input checked="" type="checkbox"/>

Series Name	<input type="text" value="ANZ B789"/>	Aircraft Company	<input type="text" value="×ANZ"/>	Aircraft Type	<input type="text" value="×B789"/>	<input type="button" value="×"/>
RGS Type	<input type="text"/>	Tail Number	<input type="text"/>	Designation	<input type="text" value="×NORMAL"/>	<input type="button" value="×"/>
		ATSP	<input type="text" value="×NZZO"/>			<input checked="" type="checkbox"/>

+ Add new graph

Reload all graphs

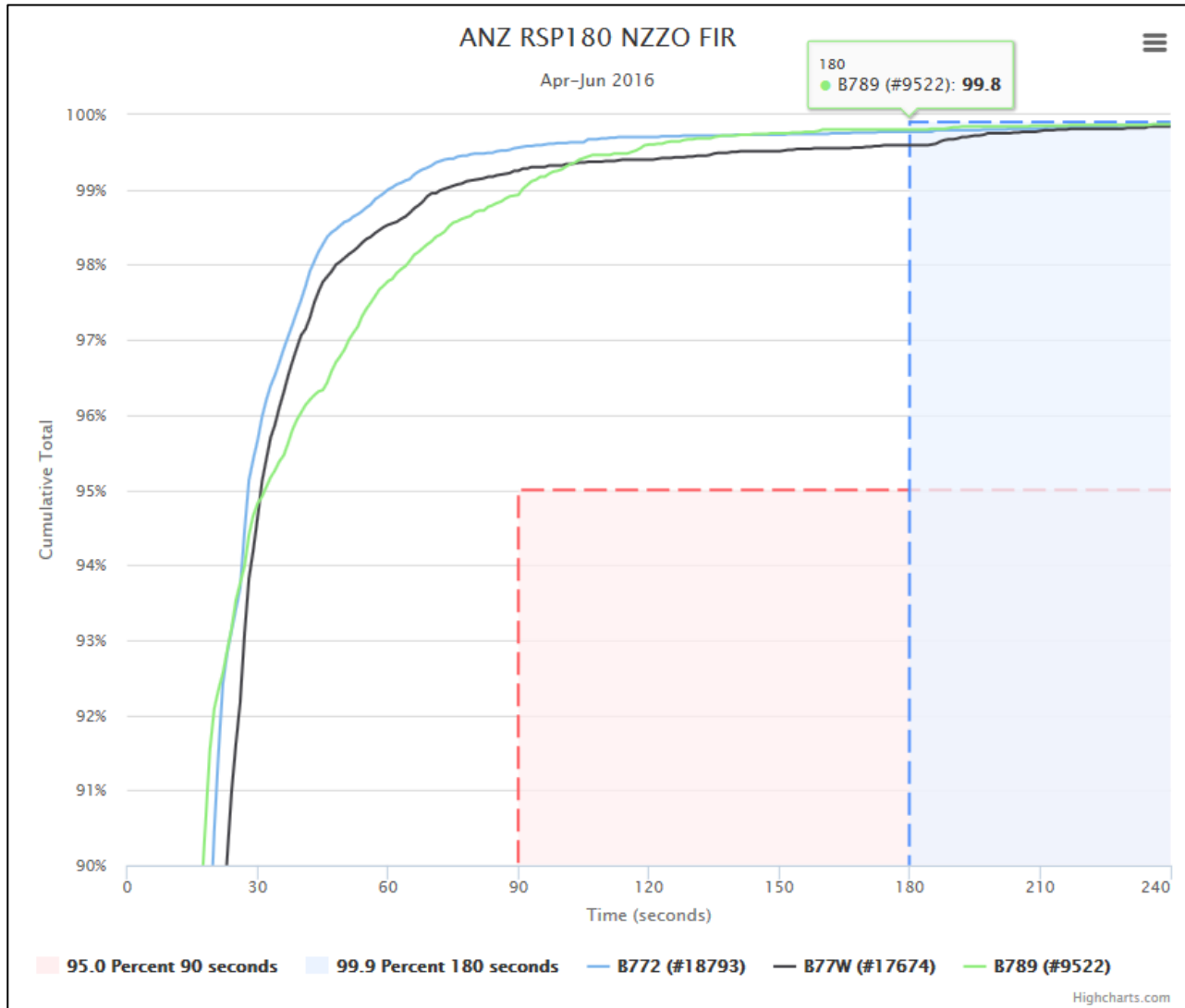
Date From	<input type="text" value="2016-01-01"/>	Date To	<input type="text" value="2016-06-30"/>
-----------	---	---------	---

Chart Minimum Percentage	<input type="text" value="90"/>	Chart Minimum Time (sec)	<input type="text" value="240"/>	RSP	<input type="text" value="RSP180"/>
--------------------------	---------------------------------	--------------------------	----------------------------------	-----	-------------------------------------

Chart Title	<input type="text" value="ANZ RSP180 NZZO FIR"/>	Sub-title	<input type="text" value="Jan - June2016"/>
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ADS-C Graphical – Example



ADS-C Tabular Analysis Page



ADS-C Tabular Data Selection

ADS-C Tabular Data Selection

Aircraft Company Aircraft Type Tail Number ATSP

Show each **1** Show each Show each Show each

RGS Media Type Date From Date To

Show each

Title **2** Hide Rows Fewer Than

Table rows to be generated : 9 **3**

ADS-C Performance								
Colour Key		Period -				95% RSP180 Benchmark	99.9% RSP180 Benchmark	
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
Analysis by								

1 Clicking in each data selection field will activate a drop down menu of available selections. A blank field will select all. Available data selection fields are : Aircraft Company; Aircraft Type; Tail Number; ATSP; RGS; Media Type; Date From; Date To.

2 Enter a title for the table which is displayed on the title bar **3** As data selections are made the application displays the number of rows that will be generated when complete select

ADS-C Tabular - Building a Table

Filter displayed table to remove rows of less than specified number of messages.

Title

ANZ B772 RSP180 NZZO

Hide Rows Fewer Than

1

✓ Load table data

Table rows to be generated : 2

ADS-C Performance								
Colour Key		Period 1 Jan 2015 - 31 Dec 2015					95% RSP180 Benchmark	99.9% RSP180 Benchmark
■	Meets Criteria							
■	99.0%-99.84%							
■	Under Criteria							
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
ANZ B772 RSP180 NZZO								
SATCOM All	All	B772	ANZ	All	All	44330	99.49	99.81
VHF All	All	B772	ANZ	All	All	13578	99.89	99.99



ADS-C Tabular - Example

ADS-C Performance								
Colour Key		Period 1 Apr 2016 - 30 Jun 2016					95% RSP180 Benchmark	99.9% RSP180 Benchmark
■	Meets Criteria							
■	99.0%-99.84%							
■	Under Criteria							
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
A332 KZAK NZZO								
SATCOM All	All	A332	CAL	All	All	1409	99.07	99.29
SATCOM All	All	A332	CCA	All	All	5166	99.59	99.76
SATCOM All	All	A332	CES	All	All	16238	99.4	99.66
SATCOM All	All	A332	CSN	All	All	1856	99.73	99.78
VHF All	All	A332	CAL	All	All	435	99.54	99.77
VHF All	All	A332	CCA	All	All	968	99.79	99.79
VHF All	All	A332	CES	All	All	1723	99.7	99.82
VHF All	All	A332	CSN	All	All	513	99.61	99.61
HF All	All	A332	CCA	All	All	326	85.27	96.93
HF All	All	A332	CES	All	All	814	79.23	92.38
HF All	All	A332	CSN	All	All	79	75.94	88.6

CPDLC Graphical – differences

The screenshot shows a web-based interface for CPDLC graphical data. At the top, there are two input fields labeled 'RGS Type' and 'ATSP'. Below them is a green button with a plus sign and the text '+ Add new graph'. Three blue star-shaped callouts are placed over the interface: callout 1 is over the '+ Add new graph' button; callout 2 is over the 'Filter' dropdown menu; callout 3 is over the 'RCP' dropdown menu. The interface includes several form fields: 'Field' (dropdown menu with 'ACTP' selected), 'Filter' (dropdown menu with 'FULL' selected), 'Date From' (text input with '2016-01-01' and a calendar icon), 'Chart Minimum Percentage' (text input with '90'), 'Chart Minimum Time (sec)' (text input with '160'), 'RCP' (dropdown menu with 'RCP240' selected), 'Chart Title' (text input with 'Title'), and 'Sub-title' (text input with 'Chart Sub-title'). At the bottom, there is a 'Title' and 'Chart Sub-title' label, and a progress bar showing '100%'.

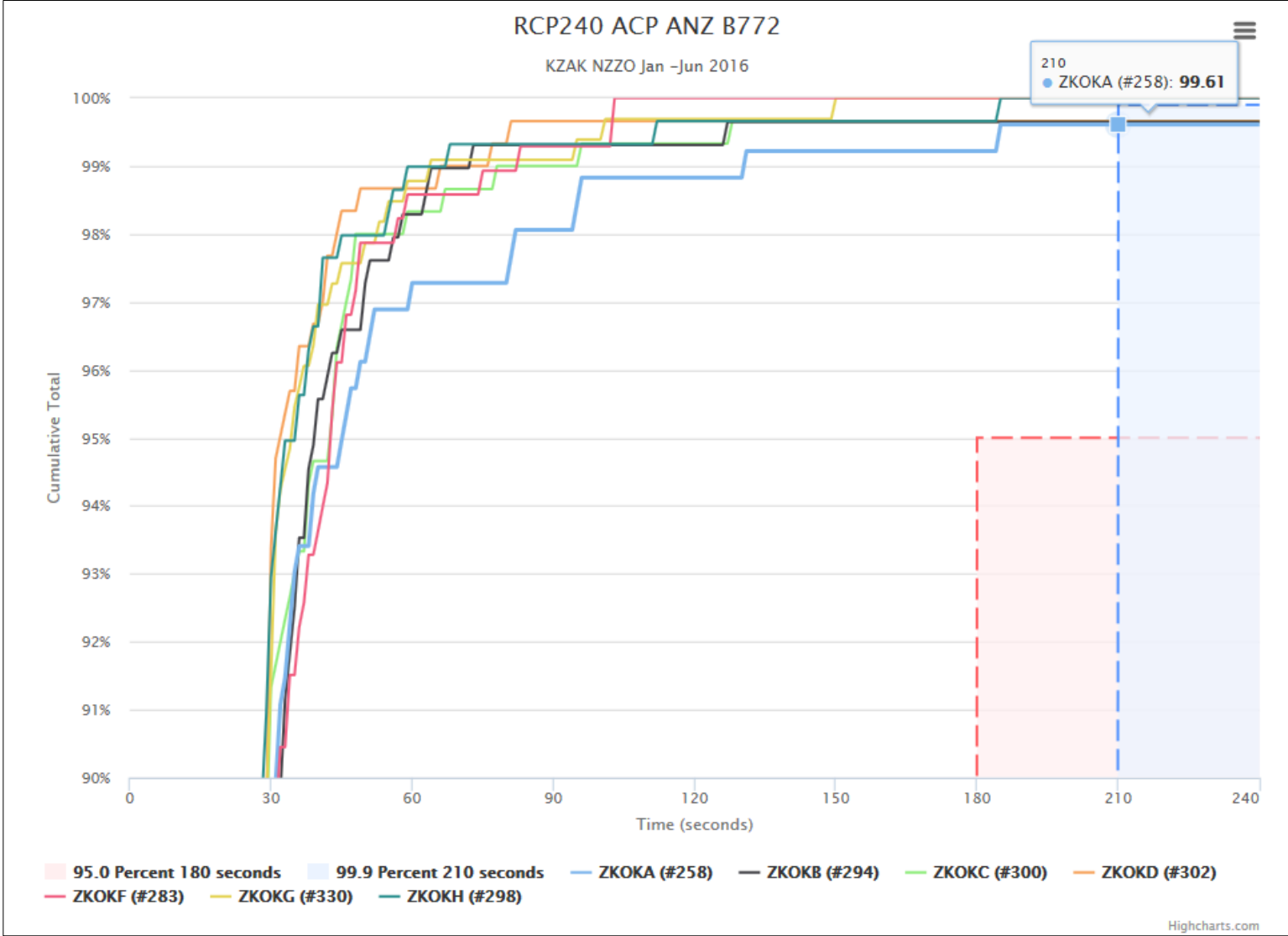
1 Field - select ACTP, ACP, or PORT **2** analysis Filter – select FULL or **3** RESTRICTED filter

Note: FULL = Filter out messages - Route: UM79-84, UM91, UM92 Resume Normal Speed: UM116 Contact Instructions: UM117-UM123

RESTRICTED = Don't filter Contact Instructions.



CPDLC Graphical – example



CPDLC Tabular - differences

The screenshot shows the CPDLC Tabular interface with the following elements:

- RGSType** and **ATSP** input fields at the top.
- + Add new graph** button.
- Field** dropdown menu with **ACTP** selected. Callout **1** points to this dropdown.
- Filter** dropdown menu with **FULL** selected. Callout **2** points to this dropdown.
- Date From** input field with **2016-01-01** and a calendar icon.
- Chart Minimum Percentage** input field with **90**.
- Chart Minimum Time (sec)** input field with **160**.
- RCP** dropdown menu with **RCP240** selected.
- Chart Title** input field with **Title**.
- Sub-title** input field with **Chart Sub-title**. Callout **3** points to this field.
- Title** and **Chart Sub-title** labels below the input fields.
- 100%** progress indicator at the bottom left.

1 Field - select ACTP, ACP, or PORT analysis
RESTRICTED filter




Filter – select FULL or

**Note: FULL = Filter out messages - Route: UM79-84, UM91, UM92 Resume
Normal Speed: UM116
Contact Instructions: UM117-UM123**

RESTRICTED = Don't filter Contact Instructions.

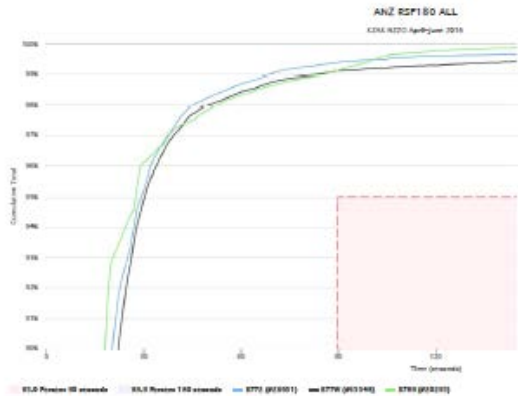


CPDLC Tabular - example

CPDLC Performance										
Colour Key		Period 1 Apr 2016 - 30 Jun 2016					95% RCP240 Benchmark	99.9% RCP240 Benchmark		
	Meets Criteria	Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count		
	99.0%-99.84%								RCP <= 120 sec	RCP <= 150 sec
	Under Criteria	RCP240 ACTP KZAK NZZO ANZ								
		SATCOM I4	All	B772	ANZ	All	All	538	99.44	99.44
		SATCOM I4	All	B77W	ANZ	All	All	1413	99.15	99.29
		SATCOM I4	All	B789	ANZ	All	All	51	100	100
		SATCOM MTSAT	All	B772	ANZ	All	All	817	99.75	99.75
		SATCOM MTSAT	All	B77W	ANZ	All	All	279	99.64	99.64
		SATCOM MTSAT	All	B789	ANZ	All	All	435	100	100

Printing graphs and tables

- Tool uses the normal print capability available in most browsers



ADS-C Performance								
Period 1 Apr 2016 - 30 Jun 2016							95% RSP180 Benchmark	99.9% RSP180 Benchmark
Media Type	RGS	Aircraft Type	Operating Company	Tail Number	ATSP	Message Count	RSP <= 90 sec	RSP <= 180 sec
KZAK NZZO ANZ B77W B789								
SATCOM14	AME1	B77W	ANZ	All	All	21988	99.08	99.5
SATCOM14	APK1	B77W	ANZ	All	All	5664	98.58	99.13
SATCOM14	AME1	B789	ANZ	All	All	1441	99.44	100
SATCOM MTSAT	MTS1	B77W	ANZ	All	All	5452	99.35	99.7
SATCOM MTSAT	MTS1	B789	ANZ	All	All	15055	98.89	99.88

Note : considering enhancement that will allow user to save graphs and tables on-line and allow access to others by individual url links

2/08/2016

2/08/2016




Delete imported records

PBCS Analysis

Overview

- Import ADS-C CSV
- Clean Imported ADS-C Data
- ADS-C Graphs
- ADS-C Tabular
- Import CPDLC CSV
- Clean Imported CPDLC Data
- CPDLC Graphs
- CPDLC Tabular
- Delete ADS-C Data** 1
- Delete CPDLC Data
- Admin Interface

Delete data loaded from selected files



If you continue all data imported from the selected files, will be deleted.

This will delete 454340 records from the database

Are you sure you wish to proceed?

3 Delete data Cancel

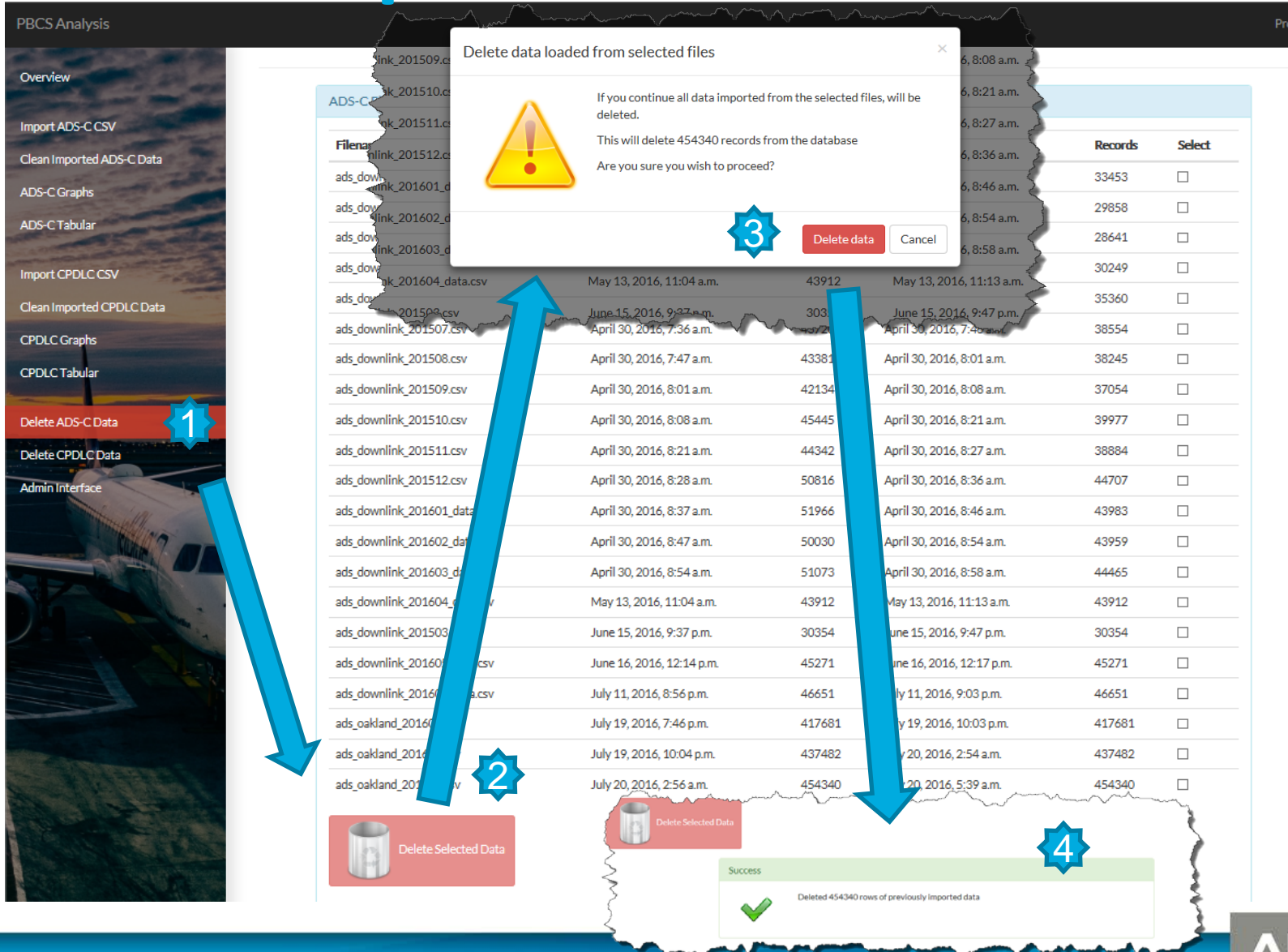
Filename	Records	Select
ads_downlink_201509.csv	33453	<input type="checkbox"/>
ads_downlink_201510.csv	29858	<input type="checkbox"/>
ads_downlink_201511.csv	28641	<input type="checkbox"/>
ads_downlink_201512.csv	30249	<input type="checkbox"/>
ads_downlink_201601_data.csv	35360	<input type="checkbox"/>
ads_downlink_201602_data.csv	38554	<input type="checkbox"/>
ads_downlink_201603_data.csv	38245	<input type="checkbox"/>
ads_downlink_201604_data.csv	37054	<input type="checkbox"/>
ads_downlink_201503.csv	39977	<input type="checkbox"/>
ads_downlink_201507.csv	38884	<input type="checkbox"/>
ads_downlink_201508.csv	44707	<input type="checkbox"/>
ads_downlink_201509.csv	43983	<input type="checkbox"/>
ads_downlink_201510.csv	43959	<input type="checkbox"/>
ads_downlink_201511.csv	44465	<input type="checkbox"/>
ads_downlink_201512.csv	43912	<input type="checkbox"/>
ads_downlink_201601_data.csv	43912	<input type="checkbox"/>
ads_downlink_201602_data.csv	30354	<input type="checkbox"/>
ads_downlink_201603_data.csv	30354	<input type="checkbox"/>
ads_downlink_201604_data.csv	45271	<input type="checkbox"/>
ads_downlink_201605_data.csv	45271	<input type="checkbox"/>
ads_downlink_201606_data.csv	46651	<input type="checkbox"/>
ads_oakland_201607.csv	46651	<input type="checkbox"/>
ads_oakland_201608.csv	417681	<input type="checkbox"/>
ads_oakland_201609.csv	417681	<input type="checkbox"/>
ads_oakland_201610.csv	437482	<input type="checkbox"/>
ads_oakland_201611.csv	437482	<input type="checkbox"/>
ads_oakland_201612.csv	454340	<input type="checkbox"/>

Delete Selected Data

4

Success

Deleted 454340 rows of previously imported data



Thank you

