PRODUCT & SUPPORT

ATR
PERFORMANCE
SOFTWARE
FOS & SPS

ATR

PROPELLING THE NEXT CONNECTION

FOS & SPS A COMPLEMENTARY PERFORMANCE SOFTWARE SUITE

As the aircraft manufacturer, we provide our customers with comprehensive performance data allowing the aircraft to operate within the certified flight envelope and in compliance with operational regulations. Apart from the traditional paper-based data that is provided in the Airplane Flight Manual (AFM), ATR has developed the Flight Operations Software (FOS) and the Single-point Performance Software (SPS), allowing easier and faster calculations for day to day airline operations.

The **FOS** is designed to compute all performance data required to ensure the safe and optimal operations of ATR aircraft. The FOS is a PC-based software allowing performance computations for various flight phases. The FOS is composed of five computation modules and several databases, all detailed in the joined leaflets.

The **SPS** is a user-friendly application, with cockpit "look and feel" interfaces that provides straightforward access to takeoff, landing cards and weight and balance computations. The SPS can be hosted on any portable Electronic Flight Bag (EFB), running on Windows or iOS, as well as on ground PCs. The SPS allows end-users being more autonomous in the calculation. It affords the operators a "less paper" solution on board the aircraft, provided appropriate operational approval has been obtained from local Authority. The SPS is composed of three computation modules and three databases, all detailed in the joined leaflets. SPS administration is done thanks to the FOS.

The **FOS and SPS**, derived from AFM data, offer the best guarantee in terms of performance analysis reliability. FOS and SPS are invaluable tools at each step of your operations: flight preparation, in-flight and flight analysis.

FLIGHT OPS ENGINEERS
FOS
• Takeoff and landing charts
• Cruise tables
• Operational Flight Plans
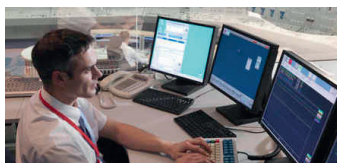• Drift Down studies
• Cruise Performance Monitoring

SPS
• SPS administration
• Back office calculations

LOADMASTERS
SPS
• Load and trim sheets

DISPATCHERS
SPS
• Weight limitations
• Takeoff and landing cards
• Pilots' support

FOS
• Takeoff and landing charts
• Operational Flight Plans

PILOTS ON GROUND
SPS
• Weight limitations
• Takeoff and landing cards
• Load and trim sheets

FOS
• Takeoff and landing charts
• Operational Flight Plans

PILOTS ON BOARD
SPS
• Load and trim sheets
• Weight limitations
• Takeoff and landing cards
• Following en-route failure performance updates

FOS
• Takeoff and landing charts
• Operational Flight Plans

FOS & SPS
DATABASES

Aircraft, runway and route data are required to run the FOS and SPS calculations. Those data are stored in dedicated databases, managed in the FOS. The database parameters are filled-in manually or imported from provider's airport and route data.
The operator is responsible for the database content; ATR does not provide any airport, obstacles or routes data.

FLEET DATABASE

The Fleet database is aimed at listing all aircraft from the operator's fleet, with their corresponding performance characteristics. The Fleet database is common for FOS and SPS applications. One or several Fleet databases may be administrated. For example, one for ground stations and Flight operations department, containing all the operator's aircraft, and one for EFB containing only one aircraft.

The aircraft characteristics defined are the ones having an impact on the performance and operations of the aircraft. An aircraft is identified by its registration number; its related weights (BW, MTOW, MLW, MZFW), engine and brakes type, takeoff alignments allowances, speeds settings, etc are defined.

Additional parameters are considered for the SPS use specifically:

- Takeoff and landing parameters like cross wind limits, dispatch factor, use of reverse, etc.
- Weight and balance parameters –crew and passengers' weights, cabin and cargo configuration, operational envelope limits etc. The aircraft configuration definition has been designed to be fully customizable and allows defining any cabin type, whether there are passengers or cargo* cabin. A specific file containing all the weights and component location of one given aircraft can be furnished by ATR on request to ease the database filling.

Aircraft allowed within the Fleet database are as per the license agreement signed by the operator.

*: Cargo available for Windows SPS version.

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FOS & SPS
DATABASES

AIRPORT DATABASE

The Airport database is aimed at listing all airports the operator is operating to, with their corresponding characteristics. The Airport database is common for FOS and SPS applications. One or several airport databases may be administrated, to organize the network as convenient. The runway main characteristics are defined – e.g. lengths, slope, width – as well as the surroundings constraints having an impact on the takeoff or landing limitations – e.g. obstacles, approach climb gradients… The Airport database information may be also imported directly from specific data files – ACFT Perfo[1], SITA[1], EAG[1] and PEP[2] airport data files or any service provider that delivers Airbus text format.

(1)ACFT Perfo, SITA and EAG are airline services providers. (2) PEP is the Airbus performance software

FOS ROUTE DATABASE

The Route database is aimed at listing all routes the operator is operating, with their corresponding characteristics. The Route database is specific for FOS application. One or several airport databases may be administrated, to organize the network as convenient. The route main characteristics are defined – e.g. waypoints, obstacles, airways, MEA. The routes are then displayed in a user-friendly interface with map views on background. Route database information may be also imported from specific navigation data files in ARINC 424 format.

SPS CONFIGURATION FILE

General SPS settings, as default fill-in, interface displays and enabled computations options – e.g. access to en-route failure computation, modify runway option, print option, etc. - , are defined in the SPS configuration file. The operator has the possibility to administrate several SPS configuration files, for example, one configuration file for ground stations and one configuration file for EFB.

SPS DATABASES DISTRIBUTION

An update module, also part of the FOS, allows the SPS administrator creating SPS update packages, to be then distributed on the SPS users' platforms. The administrator selects one or more databases to be included in the update package and specify an effective date for each: this allows preloading the databases on the platform and activating them automatically when their effective dates are reached. The distribution of the update package to the users' platform is done via a USB stick (on Windows tablets) or iTunes (on iPads).

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FOS
COMPUTATION MODULES

Five computation modules are included onto the FOS, each dedicated to a certain computation type. For each module the computation parameters are defined in a "computation session" file.

The session is a unique file that combines all the computation data:
• One aircraft selected from the Fleet database
• Airport(s) or Route(s) Data selected from the Airport or Route databases
• Assumptions and settings of the computation
• Results

The computation session runs independently from the databases, ensuring the full traceability of all computation data, assumptions and results. The computation session content depends on the FOS Module; layout being the same for each module, making the filling of the session very efficient and methodic for a trained user.
Computation sessions can be managed to ease FOS utilization. It makes very convenient the performance computations with different settings and assumptions to cover the entire operating conditions.

FOS COMPUTATION SESSION

ONE AIRCRAFT
from fleet database

COMPUTATION DATA
from databases
(Airport, Route) or
Cruise Reports

COMPUTATION CASE
Assumptions
and setting

COMPUTATION RESULTS
Charts, tables, graphs,
detailed outputs…

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FOS
COMPUTATION MODULES

```
:         :                      :                      :
: -10.0 : 19351  +107/ -107 : 20018  +107/ -107 : 20666  +107/
:       : 103 103 108   4-9 : 105 105 109   4-4 : 107 107 111
:       : +0 +0 +0/ +0 +0 -1: +0 +0 +1/ -1 -1 +0: +0 +0 +0/ -1
:-------:------------------:------------------:------------
:  0.0 : 18939  +107/ -107 : 19607  +107/ -107 : 20255  +107/
:       : 102 102 107   4-9 : 103 103 108   4-4 : 105 105 110
:       : +0 +0 +0/ +0 +0: +1 +1 +0/ +0 +0 +0: +1 +1 +0/ +0
:-------:------------------:------------------:------------
:  5.0 : 18738  +106/ -107 : 19405  +107/ -107 : 20053  +107/
:       : 102 102 106   4-9 : 103 103 107   4-4 : 105 105 109
:       : +0 +0 +1/ +0 +0 +0: +0 +0 +1/ +0 +0 +0: +0 +0 +1/ +0
:-------:------------------:------------------:------------
: 10.0 : 18541  +106/ -106 : 19207  +106/ -106 : 19854  +107/
:       : 102 102 106   4-9 : 102 102 107   4-4 : 104 104 109
:       : +0 +0 +0/ -1 -1 +0: +1 +1 +0/ +0 +0 -1: +1 +1 +0/ +0
:-------:------------------:------------------:------------
: 15.0 : 18349  +105/ -105 : 19014  +106/ -105 : 19659  +107/
:       : 101 101 106   4-9 : 102 102 106   4-4 : 104 104 108
:       : +0 +0 +0/ +0 +0+0: +0 +0 +0/ +0 +0 +0: +0 +0 +0/ +0
:-------:------------------:------------------:------------
: 20.0 : 18162  +104/ -103 : 18826  +105/ -104 : 19468  +106/
:       : 101 101 105   4-9 : 101 101 106   4-4 : 103 103 107
```

MODULE 1
TAKEOFF AND LANDING CHARTS

This module computes takeoff and landing charts in which the limiting takeoff and landing weights are displayed, depending on the weather conditions, the runway and obstacles data defined in the Airport database and operational regulations. The benefit of specific aircraft setting (reverse, air conditioning, Boost, RTO power) can be easily assessed, as well as the performance decrement brought by a dispatch under MEL. In the takeoff charts, the takeoff speeds (V_1, V_R, V_2) linked to the limiting weight are displayed. They are optimized in order to provide the maximum allowable payload.

```
            : WEIGHT AT START OF CLIMB
            :--------------------------
    FL   :   13    :    14    :   15
            :--------:--------:--------
            : 15  189: 17  209: 19  2
    250   : 54  216: 61  217: 68  2
   -------:--------:--------:--------
            : 14  174: 15  192: 17  2
    240   : 48  213: 53  213: 59  2
   -------:--------:--------:--------
            : 12  161: 14  177: 15  1
    230   : 43  210: 47  210: 52  2
```

MODULE 2
IN-FLIGHT PERFORMANCE

This module computes single/twin-engine performance data (fuel consumption, time, distance…) for all "high-speed" flight phases: climb, cruise, descent and holding. This module is used to compute the performance tables given in the Flight Crew Operating Manual (FCOM). It is an essential tool for flight ops engineers to conduct all kinds of performance studies, e.g. edit the performance tables required by the flight planning system providers, edit long range cruise table, etc.

```
------------------------------------
                E.FUEL   A.FUEL    E.TI
  DESTI    LFPA     844   ......     1:1
+ ALTERNAT LFTB     108   ......    00:1
+ RESERVE   5% F     42   ......    00:0
+ FINAL RESERVE     271   ......    00:3
+ ADDITIONAL FUEL     0   ......    00:0
                    ------------------
= MIN T/O FUEL     1265   ......     2:0
+ HOTEL               0   ......    00:0
+ TAXI               14   ......    00:0
+ EXTRA FUEL     ......   ......   ..:.
                    ------------------
= MIN BLOCK FUEL   1279   ......   ..:.
```
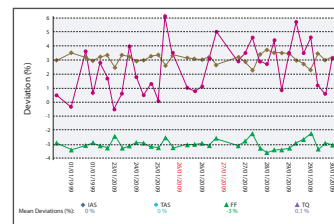
MODULE 3
FLIGHT PLANNING LOG

This module computes operational flight planning logs with accurate fuel predictions for routes extracted from the Route database, under the selected flight conditions. There is also a possibility to link a single-engine computation to the flight planning computation and define the decision points on the route; similarly to what is done in Module 4 – En-Route Net Flight Path.
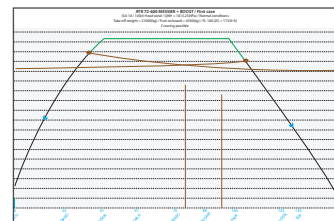
MODULE 4
EN-ROUTE NET FLIGHT PATH

The en-route net flight path module is dedicated to the calculation of regulatory performance in case of an engine failure during the flight. This is useful when operating on routes overflying mountainous areas. This module determines the weight limitations or the route decision points and allows flight ops engineer elaborating consigns for the flight crew. The En-Route Net flight Path analysis can also be performed with the accurate values for the route (takeoff weight and fuel on board) in the Module 3 - Flight Planning Log.

MODULE 5
CRUISE PERFORMANCE MONITORING

The Cruise Performance Monitoring module is used to monitor performance degradation over time. The aircraft real performance is measured in cruise and compared to the theoretical one; deviations in engine performance or fuselage drag are assessed. The main objectives of this module are:
• To adjust the aircraft performance factors used in the Module 3 - Flight Planning, or in any flight planning system or Module 2 – In-Flight Performance.
• To detect aircraft performance degradation and make appropriate corrective actions.

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SPS
COMPUTATION MODULES

The SPS is composed of three complementary computation modules: weight and balance, takeoff and landing. The SPS runs on iPads and on Windows tablets, as well as on any ground PC.

The SPS interfaces have been designed to be easy to use on-board the aircraft: the buttons and keys are large enough to be pressed in a turbulent environment. A specific colour code, similar to the FMS one has been applied for the sake of clarity. The SPS switches from Portrait to Landscape depending on the tablet orientation*.

Each module has been designed to be independent with nevertheless a commonality for Minimum Equipment List (MEL) items between takeoff and landing modules, and a possibility to transfer weight and balance outputs (weights and CG) to takeoff and landing modules.

The computation outputs can be printed under data card format for takeoff and landing. The load and trim sheet can be printed as well or sent by email. Any computation can be saved on request. SPS Takeoff and Landing modules are available for latest ATR models -ATR 72-500/-600 and 42-500/-600. SPS W&B module is available for all ATR models.*

*: available for SPS Windows version.

TAKEOFF MODULE

From atmospheric day conditions and aircraft status, the pilot or the dispatcher can easily determinate its takeoff limiting weight and generate a takeoff card including all necessary parameters for takeoff (takeoff speeds, torques, engine out procedure if any, etc.).

Takeoff speeds are optimised and calculated based on the actual aircraft weight.

The effect of air conditionning or engine power status (RTO, Boost) on performance can be rapidly assessed, to make the best decision for the payload optimisation.

Runway intersection can be considered for the computation if defined in the Airport database. NOTAM can also be considered when selecting "Modify" function that allows reducing the Takeoff Run Available (TORA) and/or add one obstacle.

Modifications do not alter databases as they are kept only for the time of the computation session.

The computation results can be saved locally on the computation platform and print under ATR standard data card format to any installed printer.

MEL items can be easily selected for computation; all MEL items having an impact on performance being available for selection. MEL items are shared between takeoff and landing modules. A MEL item selected for takeoff will be already selected for landing and vice versa.

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SPS
COMPUTATION MODULES

LANDING MODULE

As for the takeoff module, landing limiting weight and landing card including all necessary parameters for landing (speeds, Required Landing Distance or Actual Landing Distance depending on the computation type, go-around capability, etc.) can be easily computed from atmospheric day conditions and aircraft status.

The effect of air conditionning or engine power status (Boost) on performance can be rapidly assessed.

NOTAM can also be considered for the time of the computation session, by selecting the "Modify" function that allows reducing the Landing Distance Available (LDA). Modifications do not alter databases as they are kept only for the time of the computation session. MEL items can be easily selected for computation; all MEL items having an impact on performance being available for selection. MEL items are shared between takeoff and landing modules. An item selected for landing will be already selected for takeoff and vice versa.

In the SPS Landing module there is a possibility to perform two computation types. Either the computation is launched in dispatch conditions; in that case regulatory coefficients will be considered and RLD will be displayed with associated parameters. Or the computation is launched considering an en-route failure; in that case computation will consider failure coefficient and will end up with an ALD together with the associated parameters. All en-route failure items having an impact on performance are available for selection.

WEIGHT & BALANCE MODULE

Thanks to the weight and balance module the loadmaster or the pilot can generate its load and trim sheet that could be then electronically signed.

From aircraft and crew configuration, SPS calculates all necessary weights and indexes based on the cargo and passengers loading of the aircraft - full cargo version can also be managed in the Fleet database*.

A graphical output can be established and displayed with zero fuel, takeoff and landing dots checked within the operational and certified flight envelops limits. The SPS can propose an automatic distribution of passengers in each of the cabin zone. Some weight deviations to the defined configuration can be considered for the time of the computation session.

Once calculation is done, there is a possibility of transferring takeoff weight and CG in the takeoff module and landing weight in the landing modules. The results can be signed, and the load and trim sheet printed on any installed printer, or sent by email..

*: available for SPS Windows version.

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SYSTEM REQUIREMENTS:

• Microsoft® Windows XP SP3, Vista, Seven, 8 or 8.1
• A minimum of 128 MB of RAM for Windows XP (512 MB recommended)
• A minimum of 1 GB of RAM for Windows Vista (2 GB recommended)
• A minimum of 1 GB of RAM (32-bit) or 2 GB of RAM (64-bit) for Windows
  Seven (4 GB recommended)
• 32 or 64-bit processor compatible with Microsoft® Windows operating systems
• 200MB of hard disk free space
• SVGA graphic 16 bits with a minimum resolution of 800 x 600
• A local or network printer (optional for SPS)

FOS and SPS are delivered on a download platform using customer's personal
login. Customer will be notified by e-mail when a new version is available.

GLOSSARY:

AFM	Aircraft Flight Manual
ALD	Actual Landing Distance
EFB	Electronic Flight Bag
FCOM	Flight Crew Operating Manual
FOS	Flight Operations Software
GA	Go Around
LDA	Landing Distance Available
RLD	Required Landing Distance
SPS	Single-point Performance Software
TORA	Takeoff Run Available

CONTACTS:

For commercial and training information:
atc@atr-aircraft.com

For technical information:
ops.support@atr-aircraft.com

ATR
1, allée Pierre Nadot
31712 Blagnac cedex - France
T: +33 (0)5 62 21 62 21
F: +33 (0)5 62 21 68 00

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