

\*\*\*\*\*  
 \* EDDF 25L/G \* FLAPS 25 \* TOGA/FLEX \* FRANKFURT/MAIN \*  
 \*\*\*\*\*

: ALL WEIGHTS IN KILOGRAMS (KG) NOT FOR OPERATIONAL USE :

-----  
 : ELEVATION = 362 (FT) : MD-11/CF6-80C2D1F : OBSTACLES DIST/HGT :  
 : SLOPE = +0.00 (%) : DATED 13 AUG 2009 06:27UTC : :  
 : T.O.R.A. = 2850 (M) : : :  
 : T.O.D.A. = 2910 (M) : AIR COND PACKS ON : :  
 : A.S.D.A. = 2850 (M) : ANTI ICE : :  
 : LENGTH = 4000 (M) : RUNWAY : :  
 : WIDTH = 45 (M) : QNH = 1013.2 hPa : :  
 -----



-----  
 : ENGINE OUT DEPARTURE (EOSID):  
 : CLIMB STRAIGHT AHEAD TO 1900FT. TURN LEFT TO RID (D112.20) CLIMBING TO 4000FT  
 : AND HOLD (246/R).  
 -----

# TOPCAT

## Take-Off and Landing Performance Calculation Tool

TEMP	WIND COMP	IND COMP	IND COMP	WIND COMP	WIND COMP
°C	-10 KTS	+0 KTS	+0 KTS	+0 KTS	+30 KTS
-10	260671 FIELD	277040 FIELD	282884 FIELD	288785 FIELD	290000 CLIMB
	: 135 166 172	: 149 173 175	: 173 174 179	: 175 175 181	: 176 176 181
+0	256318 FIELD	272003 FIELD	277588 FIELD	283195 FIELD	289367 FIELD
	: 135 163 171	: 149 173 175	: 173 174 179	: 175 175 181	: 176 176 182
+10	252062 FIELD	267066 FIELD	272508 FIELD	277852 FIELD	283715 FIELD
	: 135 163 171	: 157 169 176	: 170 171 177	: 173 173 179	: 175 175 181
+20	248034 FIELD	262867 FIELD	268091 FIELD	273351 FIELD	278922 FIELD
	: 134 161 171	: 155 167 175	: 167 169 177	: 172 172 178	: 174 174 180
+30	240812 FIELD	255216 FIELD	260057 FIELD	264944 FIELD	270322 FIELD
	: 133 160 169	: 151 165 174	: 164 166 175	: 169 169 177	: 172 172 178
+40	232669 FIELD	245844 FIELD	250650 FIELD	255267 FIELD	260141 FIELD
	: 129 158 166	: 149 163 172	: 162 165 173	: 167 167 174	: 169 169 175
+50	219852 FIELD	234169 FIELD	238320 FIELD	242510 FIELD	244213 CLIMB
	: 124 154 163	: 146 160 168	: 158 162 169	: 164 164 171	: 164 164 172
+56*	213129 FIELD	226873 FIELD	230942 CLIMB	230942 CLIMB	230942 CLIMB
	: 124 152 162	: 146 159 166	: 158 160 167	: 160 160 167	: 160 160 167
+58*	211170 FIELD	224665 FIELD	226519 CLIMB	226519 CLIMB	226519 CLIMB
	: 124 152 162	: 145 159 165	: 156 159 166	: 159 159 166	: 159 159 166
+60*	209140 FIELD	222096 CLIMB	222096 CLIMB	222096 CLIMB	222096 CLIMB
	: 124 152 161	: 144 157 165	: 154 157 165	: 157 157 165	: 157 157 165

Written by

Richard McDonald Woods

Christian Grill

Judith Blaschegg

-----  
 \* = EXCEEDS RWY ENV TEMP LIMIT = +50°C  
 : RWY ASS TEMP LIMIT = +60°C  
 -----

-----  
 : --PRESSURE CORRECTION--  
 : +1 HPA : +200 KG : +207 KG : +219 KG : +122 KG : +63 KG :  
 : -1 HPA : -305 KG : -320 KG : -336 KG : -351 KG : -358 KG :  
 -----

: MAX BRAKE RELEASE WEIGHT MUST NOT EXCEED MAX CERT TAKEOFF WEIGHT OF 285990 KG :  
 -----



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# Chapter 1

## Introduction & Installation





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## Introduction

**The TOPCAT program is for use with flight simulation software only.  
It shall not be used in any connection with real-world flying.**

TOPCAT is a highly realistic, easy-to-use planning tool for all serious flight simulator enthusiasts. It brings into a single application all of the calculations required to plan for safe and repeatable Take-Offs and landings.

TOPCAT will provide you, the captain, with Load Sheets, Take-Off and Landing Performance Data reports including all relevant speeds (V1, VR and V2), de-rated and assumed temperatures and limiting weights (field limit, obstacle limit, climb limit, brake energy limit and tire speed limit).

In the real airline world, Dispatch Departments are responsible for the issue of load sheets to captains. This is usually performed immediately after closing the flight to any additional passengers and freight. Load sheets can be either a sheet of paper carried to the flight deck by a loadmaster, or printed on the flight deck printer.

If you are flying for a virtual airline that operates a dispatch operation, then they may choose to be the users of TOPCAT and you will then receive the load sheet directly onto to your flight deck printer via ACARS. See Jeroen Hoppenbrouwers' ACARS system (<http://www.hoppie.nl/acars>).

If you are flying on your own or your virtual airline does not support a dispatch operation, then you will be the user of TOPCAT on your (virtual) flight deck.

### Why TOPCAT?

In reading the text below about taking-off and landing, you should be asking yourself "With all these variables, how can I know the speeds and weights at which I Take-Off and land safely each and every time"? Well, as you will know shortly, calculating these speeds is not a simple matter.

Luckily TOPCAT is here to help you set the speeds and weights at which these manoeuvres can be safely executed.



## System Requirements

- Microsoft® Windows® 95, 98, ME, 2000, XP, Vista or Windows® 7
- Pentium 2 Processor with 256MB RAM or more
- Screen resolution of 965x650 pixel or more
- 15 MB hard disc space
- CD-ROM drive\*
- Internet Connection\* (for product activation)



95/98/ME



2000



XP



VISTA



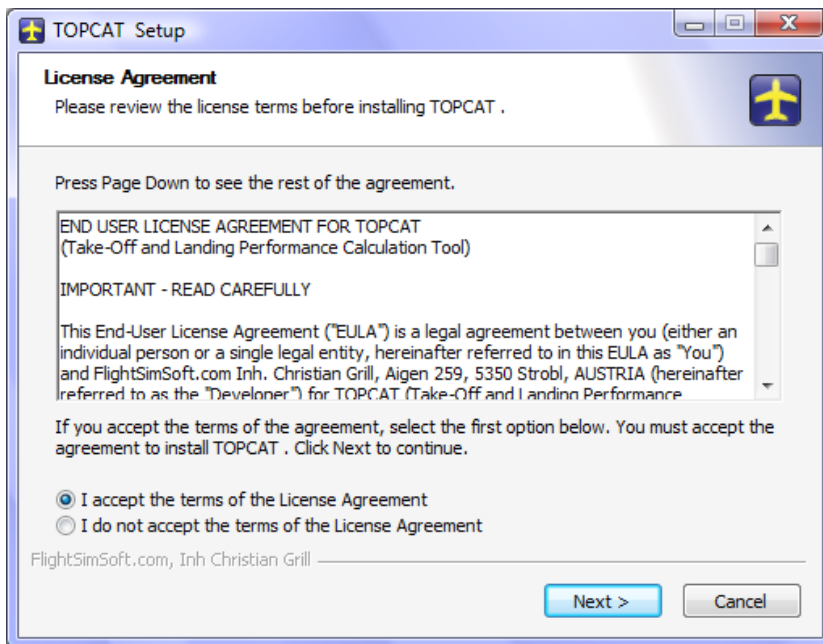
**Windows 7**  
**(32 & 64 bit)**

\*boxed version only

## Installation

TOPCAT comes as a Microsoft® Windows® 32 bit executable installation package including an uninstall function. Execute the installer file and follow the instructions on the screen.

Before installing TOPCAT read the *End User License Agreement (EULA)* carefully.



## Support & Updates

- The latest program updates can be found at <http://www.topcatsim.com>
- A user forum is available at <http://www.topcatsim.com/forum>
- For further questions contact [support@topcatsim.com](mailto:support@topcatsim.com)



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# Chapter 2

## Configuration

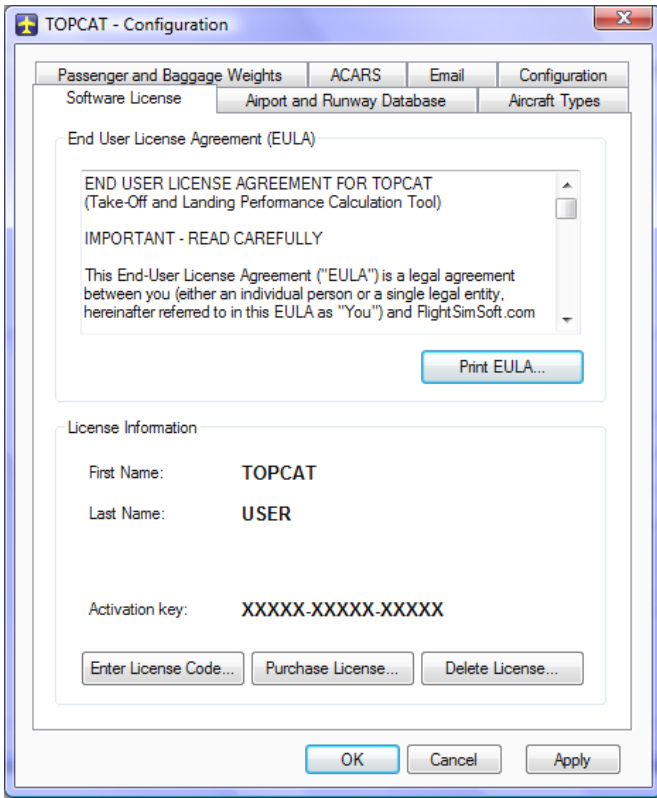




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## License

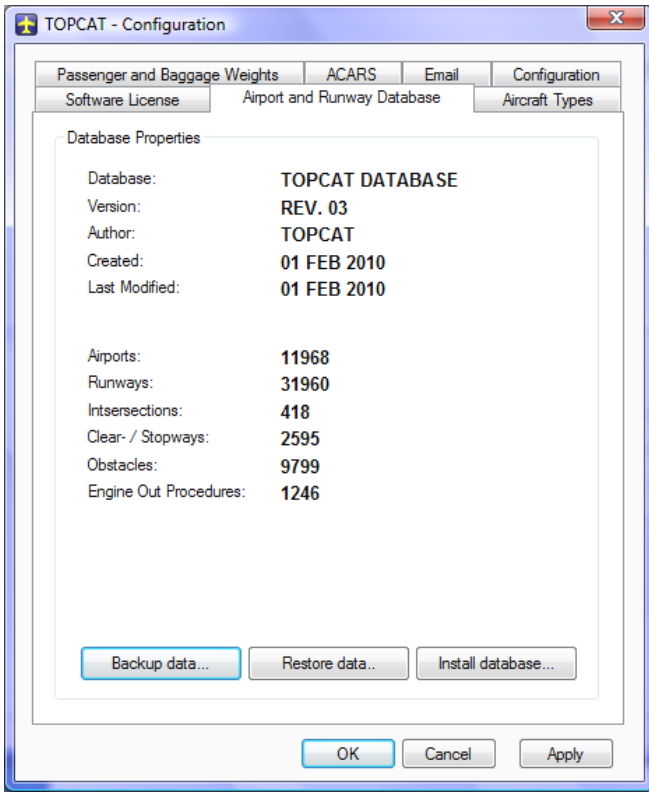


The *Software License* tab shows detailed information about your TOPCAT license and enables you to print the *End User License Agreement (EULA)*, if required.

- The *Enter license code* button is used to activate the product.
- *Buy License* is linked to the TOPCAT homepage and shows information on how to purchase a license.
- *Remove license* will deactivate the software to allow installation on another device.



## Airport & Runway Database

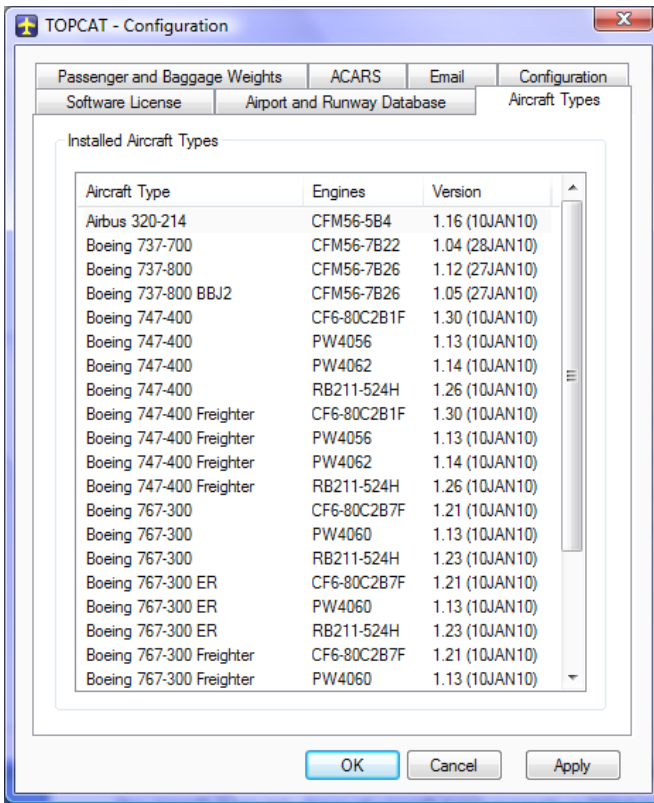


This tab shows detailed information and modification dates of the *Airport and Runway Database* installed.

- To backup whole or part of your database use the *Backup data* button.
- The *Restore data* button is used to restore these data.
- *Install database* can be used to install a new database, overwriting your existing one.



## Aircraft Types



The *Aircraft Types* tab shows all aircraft types currently installed in TOPCAT along with its version number and release date.

- Use the *Delete type* button to permanently remove an aircraft type.
- *Install new type* to add an aircraft type to TOPCAT.



## Passenger and Baggage Weights

Type of Flight	Scheduled	Charter
Adult Weight	84 kg	76 kg
Child Weight	35 kg	35 kg
Infant Weight	0 kg	0 kg

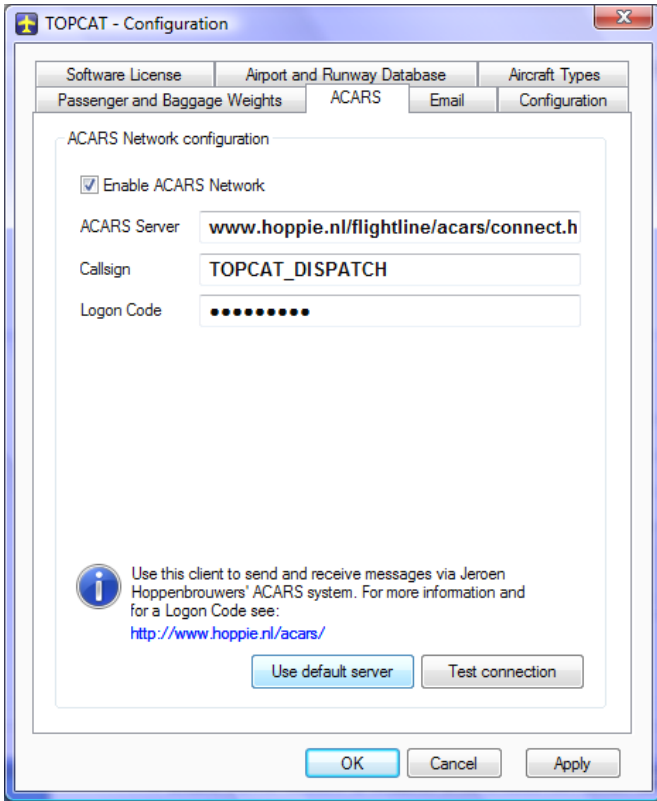
Domestic Flight	11 kg
International Flight	13 kg
Intercontinental Flight	15 kg

To calculate the weight of the passengers, we need to know their standard weights. These normally vary depending on whether yours is a chartered or scheduled flight.

- You can manually alter the standard weights for adults, children and infants, or press *Reset* to revert to ICAO standard weights.
- *Standard baggage weight* for domestic, international or intercontinental flights can also be set.



## ACARS Configuration

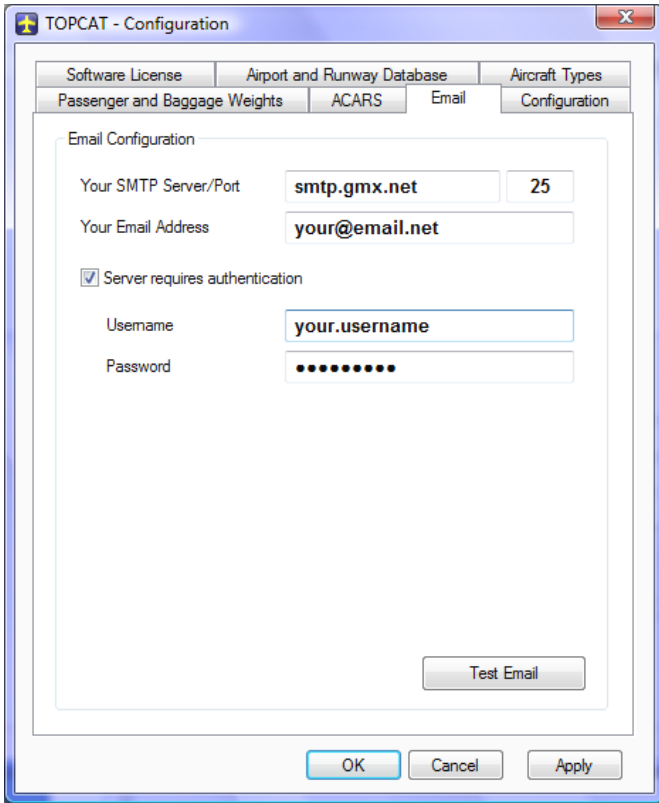


For using the ACARS client you need a *Logon Code* provided by Jeroen Hoppenbrouwers (<http://hoppie.nl/acars>).

- *Enable ACARS Network* to establish a continuous connection between TOPCAT and the *ACARS Server*.
- The *Callsign* is your station's identification.
- *Use default server* will change the ACARS server address to a default value.
- *Test Connection* will make a connection test to the ACARS server with the logon credentials provided.



## Email Configuration

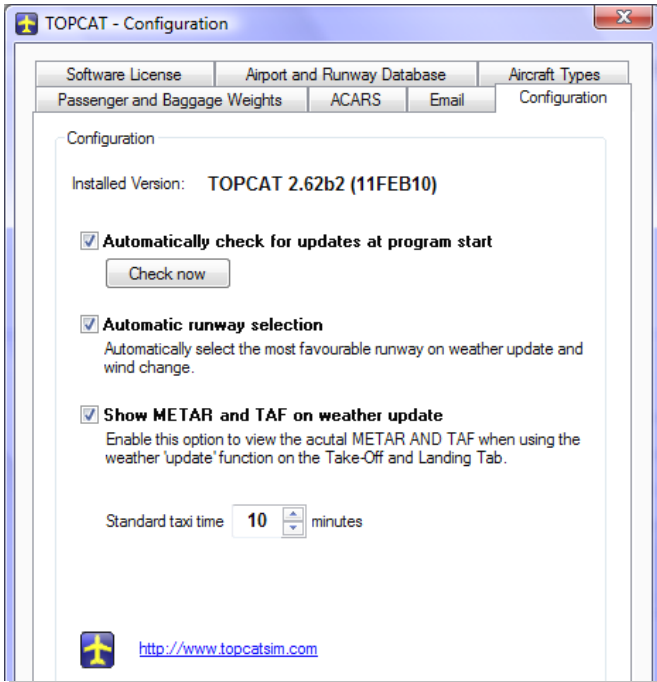


TOPCAT has a built-in Email client, enabling you to send reports (Loadsheets, Runway Tables, etc.) directly from TOPCAT to any valid email address.

- For using this Email client you need to state your *SMTP server address* and your email address. Some servers *require authentication*. Enter your *username* and your *email password*.
- *Test Email* will test your account settings by sending an email with the logon credentials provided. If you receive a test message in your email account, the test was successful.



## Configuration



The *Configuration* tab allows adjusting some basic options in TOPCAT. *Installed Version* shows the currently installed program version including release date.

- Choose the *Automatically check for updates at program start* box, if desired or *Check now* to look for recent program updates (requires internet connection).
- Use the *Automatic runway selection* feature to let TOPCAT determine the most favourable runway depending on actual wind conditions.
- Select *Show METAR and TAF on weather update* to bring up the full METAR and TAF when using the *'update'* function on the Take-Off and Landing tab.
- *Standard taxi time* defines the default time required to taxi from your parking position to the Take-Off runway.



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## **Chapter 3**

# **Aircraft Take-Off and Landing**





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## Take-Off

Between flights, aircraft must make safe Take-Offs and landings. As captain, you must prepare for each to ensure your passengers' safety.

Take-Off is the phase of flight in which an aircraft goes through a transition from moving along the ground (taxiing) to flying in the air, usually on a runway.



*Image 1 Capt. Carl Avari-Cooper taking off in a Boeing 747-400 of British Airways*

*Virtual at London Heathrow*

### Power settings

Large transport category (airliner) aircraft will usually use a de-rated power Take-Off, where less than full power is applied, with un-needed power held in reserve in case of emergency.

The aircraft is permitted to accelerate to rotation speed (also referred to as  $V_r$ ).

The term rotation is used because the aircraft pivots around the axis of its main landing gear while still on the ground, usually due to manipulation of the flight controls to make this change in aircraft attitude.



The nose is raised to a nominal 5° to 20° nose up pitch attitude to increase lift from the wings and effect lift-off.

Fixed-wing aircraft designed for high-speed operation (such as commercial jet aircraft) have difficulty generating enough lift at the (comparatively) low speeds encountered during Take-Off. These are therefore fitted with high-lift devices, often including slats and usually flaps, which increase the camber of the wing, making it more effective at low speed, thus creating more lift. These are deployed from the wing prior to Take-Off, and retracted during the climb. They can also be deployed at other times, such as prior to landing.

The speeds needed for Take-Off are relative to the motion of the air (indicated air speed). A headwind will reduce the ground speed needed for Take-Off, as there is a greater flow of air over the wings. A tailwind will increase the ground speed needed for Take-Off, as there is less flow of air over the wings. Strong tailwinds can make it impossible for the aircraft, given the length of the runway, to attain sufficient motion relative to the motion of the air to make a safe Take-Off.

Typical Take-Off air speeds for jetliners are in the 130–155 knot range (150–180 mph, 250–290 km/h) The Take-Off speed is directly proportional to the aircraft weight; the heavier the weight, the greater the speed needed.

### **Speed required**

The Take-Off speed required varies according to factors such as air density, aircraft gross weight, and aircraft configuration (flap and/or slat position, as applicable). Air density, in turn, is affected by factors such as field elevation and air temperature. This relationship between temperature, altitude, and air density can be expressed as a density altitude, or the altitude in the International Standard Atmosphere at which the air density would be equal to the actual air density.

Pilots of large multi-engine aircraft calculate a decision speed ( $V_1$ ) for each Take-Off that dictates action to be taken in case an engine fails.

This speed is determined not only by the above factors affecting Take-Off performance, but by the length of the runway and any peculiar conditions, such as



obstacles off the end of the runway. Below  $V_1$ , the Take-Off is aborted; at or above  $V_1$  Take-Off must be continued.

The rotation speed ( $V_r$ ) for transport category aircraft is computed such that after rotation is initiated the aircraft is in the lift-off attitude and at the lift-off speed. Then, the safe climb speed ( $V_2$ ) is reached. This speed must be maintained to meet performance targets for rate of climb and angle of climb.



## Landing

Landing is the last part of a flight, where an aircraft returns to the ground. Aircraft usually land at an airport on a firm runway, generally constructed of asphalt concrete, gravel or grass, but specially equipped aircraft are able to land on water, snow or ice.



*Image 2 Capt. Carl Avari-Cooper landing a Boeing 747-400 of British Airways Virtual at London Heathrow*

### Power settings

For aircraft, landing is generally accomplished by gradually tapering down airspeed and lift. The first landing phase is the flare, where the rate of descent will be reduced by adopting a nose-up attitude.

The attitude is held until the undercarriage touches the ground and the controls are either held until all wheels touch the ground or gently adjusted (often in the case of tail-draggers) to ensure the nose-wheel or tail-wheel lightly touches the runway.



Large transport category (airliner) aircraft are landed by "flying the airplane on to the runway." The airspeed and attitude of the plane are adjusted for landing.

The airspeed is kept well above stall speed and a constant rate of descent is maintained. Just before landing the descent rate is significantly reduced (Flare) causing a light touch down.

Usually spoilers (sometimes called "lift dumpers") are immediately deployed to dramatically reduce the lift and transfer the aircraft's weight to its wheels, where mechanical braking can take effect. Reverse thrust is used by many jet aircraft to help slow down just after touch-down.

### **Speed required**

In airliners the speed at which an aircraft lands is usually carefully calculated. Being of a great mass, airliners take time to alter their descent profile and speed. Landing speed must, of course, be safely above the stalling speed, but slow enough for the aircraft to land at the touch-down point and give sufficient ground roll distance in which to safely decelerate prior to runway turn-off.

Factors such as crosswind, where the pilot will use a crab landing or a slip landing, will cause pilots to land slightly faster and sometimes with different attitudes to ensure proper handling and safety of the plane. Other factors affecting a particular landing might include some or all of the following:

- The plane size and configuration, particularly the deployment of flaps and slats to increase lift and thus reduce the stalling speed of the aircraft.
- Wind direction and strength. You will normally Take-Off and land into wind to minimise the ground speed required for safe flight.
- Landing weight. During flight, you will have burnt off an amount of fuel. Therefore, on landing, the aircraft will weigh (considerably) less than at Take-Off. A landing speed can usefully take account of this drop in weight to require a lower speed.
- Runway length and slope will affect whether a runway may be considered safe for landing. Landing on a downhill runway will require a greater stopping



distance than landing on an uphill one. The deployment of spoilers and wheel brakes on the ground must be able to reduce the aircraft to taxiing speed before turning from the runway.

- Runway altitude affects your landing speed quite dramatically. Air becomes less dense with altitude and therefore your wings will provide less lift. You will have to set a higher landing speed at altitude than at sea level.
- Air temperature affects your landing speed as it too becomes less dense with rising temperature.
- On a cold day, air pressure will tend to be higher than on a warm day. A higher air pressure will provide more lift from your wings thus reducing the speed required for landing.

There are many factors in performing successful landings. Professional pilots have extensive training, experience and certification on the types of planes they are flying.



## **Chapter 4**

### **The TOPCAT program**



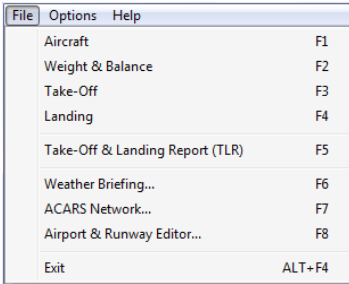


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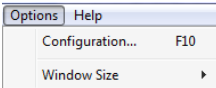
## The TOPCAT menu

### File menu



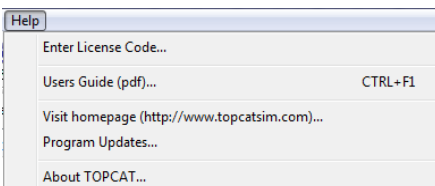
The *File* menu options *Aircraft*, *Weight & Balance*, *Take-Off*, *Landing*, *Take-Off & Landing Report (TLR)*, *Weather Briefing*, *ACARS Network* and *Airport & Runway Editor*. These are the same functions as described under separate headings for the program tabs below.

### Options menu



*Options* enable you to Configure TOPCAT to meet your personal needs.

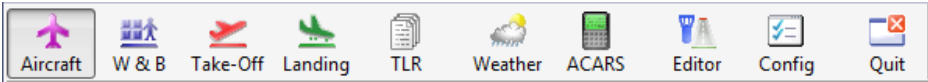
### Help menu



The *Help* menu item has the options *Enter License Code*, *Users Guide (pdf)*, *Visit homepage*, *Program Updates* and *About TOPCAT*.



## TOPCAT toolbar



The main TOPCAT window shows ten tabs respectively labeled:

- |                  |          |   |
|------------------|----------|---|
| <b>Aircraft</b>  | <F1>     | Setup your aircraft weights, configuration and thrust policies.   |
| <b>W &amp; B</b> | <F2>     | <i>Weight &amp; Balance</i> : Setup passenger, cargo and fuel load for your flight. Produce a Loadsheet and export the results to Microsoft® Flight Simulator®. |
| <b>Take-Off</b>  | <F3>     | Plan your Take-Off under various conditions. Let TOPCAT optimize flaps and thrust settings for a given runway.  |
| <b>Landing</b>   | <F4>     | Plan your landing under various conditions. TOPCAT will give you landing distances for different brake settings and inoperative items.                          |
| <b>TLR</b>       | <F5>     | <i>Take-Off and Landing Report</i> : Create your individual Take-Off and/or Landing Report for desired runways and defined weather conditions.                  |
| <b>Weather</b>   | <F6>     | Download weather from NOAA, IVAO, VATSIM or Active Sky.   |
| <b>ACARS</b>     | <F7>     | Send and receive messages via Jeroen Hoppenbrouwers' ACARS Network (only shown if ACARS client is enabled in configuration menu).                               |
| <b>Editor</b>    | <F8>     | Add and modify airports and runways.  |
| <b>Config</b>    | <F10>    | Configure TOPCAT to meet your personal requirements.  |
| <b>Exit</b>      | <ALT+F4> | Shutdown TOPCAT.  |

Each of these tabs is described in detail below.



## Aircraft

The screenshot shows the TOPCAT - Take-Off and Landing Performance Calculation Tool interface. The main window displays an 'Aircraft Database' table with columns for Registration, Type, Engines, Cabin layout, DOW, MZFW, MTOW, and MLW. The aircraft N-5678 is selected and highlighted in blue. Below the table, the 'Aircraft Details' for N-5678 are shown, including Type (McDonnell Douglas MD-11), Engines (CF6-80C2D1F), Configuration (PMDG High Density), Cabin layout (Y408), Passenger capacity (408), Cargo capacity (43291 kg), Fuel capacity (116226 kg), and SELCAL code (AS-MR). The interface also includes a menu bar (File, Options, Help) and a toolbar with icons for Aircraft, W & B, Take-Off, Landing, TLR, Weather, ACARS, Editor, Config, and Quit.

Registration	Type	Engines	Cabin layout	DOW	MZFW	MTOW	MLW
N-8901	McDonnell Douglas MD-...	CF6-80C2D1F	FREIGHTER	250996 lb	451300 lb	630500 lb	471500 lb
N-5678	McDonnell Douglas MD-11	CF6-80C2D1F	Y408	124000 kg	204706 kg	285990 kg	213869 kg
N-4268	McDonnell Douglas MD-11	CF6-80C2D1F	F34 Y288	273373 lb	451300 lb	630500 lb	471500 lb
N-3456	Fokker F28 Mark 100	Tay 650-15	F12 Y85	24527 kg	36740 kg	44452 kg	39916 kg
N-5379	Boeing 767-300 ER	CF6-80C2B7F	C48 Y216	197000 lb	288000 lb	408000 lb	310000 lb
N-2345	Boeing 767-300 ER	RB211-524H	C48 Y216	192000 lb	288000 lb	408000 lb	310000 lb
N-1234	Boeing 767-300	PW4060	C25 Y188	90419 kg	126099 kg	156489 kg	136078 kg
D-ASSH	Boeing 747-400 Freighter	CF6-80C2B1F	FREIGHTER	164871 kg	288031 kg	396893 kg	302093 kg
D-ASSG	Boeing 747-400	CF6-80C2B1F	F14 C70 Y215	178755 kg	246074 kg	396893 kg	285763 kg

Aircraft Details 'N-5678'					
Type	<b>McDonnell Douglas MD-11</b>	Dry Operating Weight (DOW)	<b>124000 kg</b>	Weight units	<b>Kilograms (kg)</b>
Engines	<b>CF6-80C2D1F</b>	Max Zero-Fuel Weight (MZFW)	<b>204706 kg</b>	Length units	<b>Meter (m)</b>
Configuration	<b>PMDG High Density</b>	Max Take-Off Weight (MTOW)	<b>285990 kg</b>	Pressure units	<b>Hectopascal (hPa)</b>
Cabin layout	<b>Y408</b>	Max Landing Weight (MLW)	<b>213869 kg</b>	Fuel quantity	<b>Liter (lit)</b>
Passenger capacity	<b>408</b>				
Cargo capacity	<b>43291 kg</b>	Allow Assumed / Flex Temp. Take-Off	<b>YES</b>	Remarks	
Fuel capacity	<b>116226 kg</b>	Allow De-Rated Take-Off	<b>NO</b>		<b>MCDONNELL DOUGLAS MD-11</b>
SELCAL code	<b>AS-MR</b>	Allow combination of both	<b>NO</b>		<b>PMDG</b>

Each aircraft that you fly will have its own unique characteristics. Each characteristic can affect the aircraft's Take-Off and landing performance.

The aircraft database allows you to specify these characteristics. This can be particularly useful if you fly for a virtual airline which maintains a fleet of aircraft, and you plan flights in a number of them.

You may also wish to experiment by varying aircraft characteristics to see the effects these variances may have on Take-Off and landing performance. You can *Add*, *Edit*, *Duplicate*, *Delete* and *Delete All* aircraft database records.

Additionally, you can *Print* and *Save (Backup)* your existing aircraft database or *Load* a previously saved aircraft database.



All of the aircraft currently in the *Aircraft Database* are shown in the *Aircraft Database* window. In the *Aircraft Details* window are shown the details of the aircraft highlighted in the *Aircraft Database* window.

### Add/modify aircraft

The screenshot shows the 'TOPCAT - Edit aircraft 'N-5678'' window. It is divided into several sections:

- Aircraft Setup:** Registration: N-5678; Type: McDonnell Douglas MD-11; Engines: CF6-80C2D1F; Thrust Policy:  Allow Assumed / Flex Temp. Take-Off,  Allow De-Rated Take-Off,  Allow Combination of both; File path: Microsoft® Flight Simulator® 'aircraft.cfg' file: PMDG MD-11 GE CF6-80C2D1F Engines.
- Units of Measurement:** Weights: Kilograms (kg); Lengths: Meter (m); Pressure: Hectopascal (hPa); Fuel quantity: Liter (liter). Buttons for Metric and Imperial are at the bottom.
- Aircraft Configuration:** Configuration: PMDG High Density; Cabin layout: Y408; Passenger capacity: 408 (Max 408); Cargo Capacity (kg): 43291 (Max 43291 kg); Fuel Capacity (kg): 116226 (Max 116226 kg); SELCAL code: AS-MR (with Random button); Remarks: MCDONNELL DOUGLAS MD-11 PMDG.
- Weights Summary - Kilograms (kg):**

Dry Operating Weight	DOW	124000	(124000 kg)
Maximum Zero-Fuel Weight	MZFW	204706	(204706 kg)
Maximum Take-Off Weight	MTOW	285990	(285990 kg)
Maximum Landing Weight	MLW	213869	(213869 kg)

### Aircraft Setup

All aircraft have to be registered, and the registration mark must be prominently displayed on the aircraft so that air traffic controllers can identify them.

To *Add* an aircraft, you must specify the *Aircraft Registration*. The registration consists of a prefix and up to six characters. The prefix is usually one or two characters followed by a hyphen and define a country registration (for example N-5678; N stands for United States).



*Take-Off Thrust policy* requires you to choose whether to *Allow De-Rated Take-Offs*, to *Allow Assumed Temperature/Flex Take-Off*, and to allow a *Combination of both*.

The higher the thrust available from the engine, the shorter the runway can be, or the greater the aircraft payload can be. This affects which airports an aircraft can be operated from, and the economics of operation.

As an alternative to payload, a higher thrust rating allows more fuel load to be carried into the air, so extending range of operation.

These trade-offs between available thrust, runway length, aircraft weight and range may need to be assessed for each flight, and is part of a commercial pilot's preparation prior to Take-Off.

An aircraft may Take-Off with less than maximum Take-Off thrust to reduce wear on the engine and extend its life. This is usually termed a 'de-rated' Take-Off, and is used to reduce engine maintenance costs.

De-rated Take-Off is a technique used by pilots to set a pre-programmed, reduced thrust setting for Take-Off. TOPCAT will know of the current meteorological conditions, the aircraft weight and the length of the runway. It will be able to recommend which de-rated Take-Off thrust setting, or none, that you should use.

An alternative to a De-rated Take-Off is the *Assumed/Flex Temperature Take-Off*.

For a De-rated Take-Off, we discussed how the current meteorological conditions are used in the calculation of Take-Off thrust. As ambient temperature rises, so the air reduces in density. And lower density air will provide a lower lift for a given thrust setting.

But if there is runway length to spare at a given airplane weight and ambient temperature, it may be appropriate to tell the FMS that the assumed ambient temperature is higher than it actually is currently. The effect of this is to cause the aircraft to set a lower Take-Off thrust and thus use some of the extra runway available.

Check the *Allow combination of both* check-box if you wish TOPCAT to combine both De-rated Take-Off and Assumed Temperature calculations in calculating recommended Take-Off thrust settings.



Uncheck all three check boxes if you want to execute full-power Take-Offs only.

You will receive error messages if appropriate thrust settings for your current aircraft weight, ambient conditions and runway nomination will not result in a safe Take-Off.

Your virtual airline may have standard operating procedures for de-rated / assumed temperature Take-Offs.

### **Microsoft® Flight Simulator® aircraft.cfg file**

Use the *Browse...* button to set the location of a Microsoft® Flight Simulator® aircraft.cfg file linked to this TOPCAT aircraft. This file may also be a network location, so TOPCAT may be running on a computer different than the computer running Flight Simulator (e.g. Laptop).

Linking an aircraft.cfg file to your TOPCAT aircraft allows you to easily update this file with passenger and cargo loads defined in the W & B (Weight and Balance) module of TOPCAT.

### **Units of Measurement**

The *Units of Measurement* field allows you to choose whether your calculations will be expressed in *kilograms* or *pounds*. The *lengths* field must be set for runway length to be expressed in either *meters (m)* or in *feet (ft)*. Runway charts always show lengths in both units.

Current airfield air *pressure* can be expressed as *hectopascals* or *inches of mercury*. Hectopascal (symbol hPa) is an SI unit, the international system of units now recommended for all scientific purposes. Inches of mercury (symbol inHg) is an older method of measuring air pressure, and is still widely used in North America.

Fuel quantity can either be shown in *Liters* or *Gallons*.

Use the *Metric* or *Imperial* button to switch between units. European airlines tend to use the metric system, the United States of America the avoirdupois (imperial) system.

You must be prepared to use one system of pressure measurement for Take-Off and the other for landing, particularly if you are flying an intercontinental leg.



## **Aircraft Configuration**

An aircraft, say a Boeing 747-400, can be configured for many different numbers of passenger seats, cargo capacities and fuel capacities. Airlines choose different aircraft configurations to suit their marketplaces.

TOPCAT comes with a set of standard Configurations, tailored to specific Flight Simulator Add-Ons. For a given Aircraft Configuration, TOPCAT will set a maximum number of *Passenger Seats* available, the maximum *Cargo Capacity* and maximum *Fuel Capacity*.

A sample configuration would be 'F16 C85 Y230' meaning that there are 16 First Class seats, 85 Business Class seats, and 230 Economy Class seats installed.

Finally you may set the aircraft's *SELCAL Code* or press the *Random* button to generate a random value.

Selcal, or Selective Calling as it is more correctly known, is an automatic recognition system that is operated by a two tone signal. The equipment is connected to the HF radios on aircraft and monitors for a call even when the squelch is turned up, and the pilots can hear nothing.

Use the *Remarks* section to add additional aircraft information for easier differentiation.

## **Weights**

For Take-Off calculations you require an accurate calculation of the aircraft's Take-Off weight (see Weight & Balance section). An aircraft's Take-Off weight is calculated by adding fuel weight and payload to its Dry Operating Weight. Dry Operating Weight plus payload is called Zero-Fuel Weight. Zero Fuel-Weight plus fuel weight is the aircraft's Take-Off Weight.

- An aircraft's Zero-Fuel Weight (ZFW) must not exceed its Maximum Zero-Fuel Weight. (MZFW)
- An aircraft's Take-Off Weight (TOW) must not exceed its Maximum Take-Off Weight (MTOW).



- An aircraft's Landing Weight (LDW) must not normally be allowed to exceed its Maximum Landing Weight (MLDW).

On some aircraft types fuel may be jettisoned if an urgent landing is required so that its weight can be reduced to lower than the maximum landing weight.

In an emergency, a landing may be attempted at above the maximum fuel weight but damage may be caused to the aircraft as a result. TOPCAT will inform you accordingly, if an overweight landing is planned.

An aircraft's Dry Operating Weight (DOW), Maximum Zero-Fuel Weight (MZFW), Maximum Take-Off Weight (MTOW) and Maximum Landing Weight (MLW) are specified in the *Weights* section in either kilograms or pounds as specified in the *Units of Measurements* section (see above).

Once all of the *Aircraft Setup* fields have been specified, press *Save* to store the new/altered aircraft in the database.

Use the *Defaults* button to reset the values to those from the original database record. Press *Cancel* to abandon the add/change process.



## W & B (Weight & Balance)

The *W & B (Weight & Balance)* window will enable you to specify the loading and its distribution of the aircraft for this flight.

You will specify the *Trip Data*, check the *Weight Limits* being used, and set the *Passenger*, *Cargo* and *Fuel Loads*.

When completed, you may request a *Load Sheet*.

### Aircraft

The aircraft box reminds you of the *Registration*, *Aircraft* and *Engine Type* and *Units* for this Trip.

### Trip Data

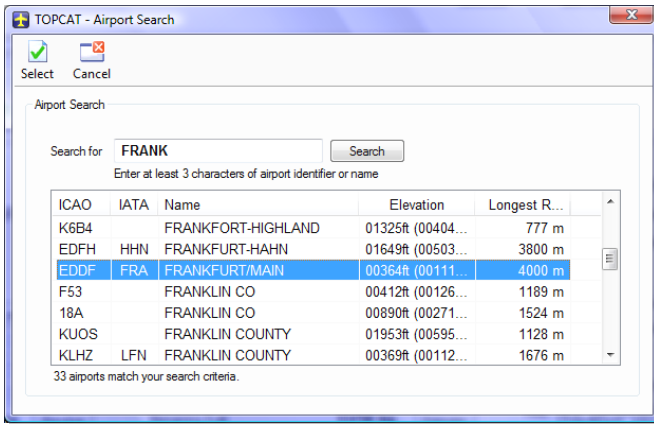
- Enter your Flight Number in the *Flight Nr.* Field (e.g. KLM123 or DLH987)



- Enter your departure airports ICAO or IATA identifier in the *From* field.
- Enter your arrival airports ICAO or IATA identifier in the *To* field.

Each of these fields has a drop-down box (labelled as a down arrow) to enable you to search for an airfield whose ICAO or IATA code you do not know.

Clicking either of these arrows will present you with the *Airport Search* window. Into the *Search for* box, enter at least 3 characters of airport identifier or name and then press the *Search* button.



You will be presented with a list of matching airports, showing all airports matching your search criteria. Choose the airport you wish and press the *Select* button. Your chosen airport code will now appear in the airport field from which you came.

Pressing *Cancel* will return you to the Loading window without selecting an airport.

### **Trip distance**

Once you have entered a valid departure and a destination airport, the estimated trip distance and estimated en-route time (EET) is shown.

*Note: The estimated trip distance is the great circle distance between departure and destination plus 15% or 300NM, whichever is less.*



The trip distance can be adjusted as necessary, but can never be less than the great circle distance between departure and destination airport.

Pressing the *Auto* button reverts to the estimated trip distance as described above.

Using the *Swap* button allows you to quickly switch the departure and destination airport for either the return flight or for an immediate return to departure.

### **Destination Alternates**

You can specify up to two destination alternate airports. These airports are shown on the *Take-Off and Landing Report* and are added to the Weather briefing.

Use the Find Alt[er]n[ate] button to automatically determine the closest suitable alternate airports.

TOPCAT cannot distinguish between civil, military and private airports. Check the results for their suitability.

*Note: TOPCAT takes into account runway length, weather and estimated landing weight for alternate airport determination. Results may differ for different weather conditions / landing weights.*

### **Weight Limits**

The *Weight Limits* are set from values for the aircraft recorded in the *Aircraft Database*. *Max Zero Fuel* is inherited from the *Aircraft Database* and cannot be changed, but you can alter the values of *Max Take Off* and *Max Landing* by entering different numeric values, by pressing *Max* to set them back to maximum structural limits.

### **Passenger Load**

Choose between *Scheduled* and *Charter* in the Type of Flight box. This will alter the passenger weights as set in the *TOPCAT Configuration* dialog.

Enter the number of Adults, Children and Infants. Their Total weight is then shown. You will be warned if you try to exceed the Passenger Seats value that you entered in the Configuration during Aircraft Setup (see above).



Use the *Random* button to randomly set passenger load or use the slider control to quickly set a passenger load.

### **Cargo Load**

Choose between *Domestic*, *International* and *Intercontinental* in the Type of Flight box. This will alter the standard baggage weight per passenger as set in the *TOPCAT Configuration* dialog.

You can enter your own value for Baggage weight if the *Use Standard Baggage Weight* check box (lock symbol) is un-checked; otherwise it will be set from the Baggage value from Standard Weights (see above).

Set the values for *Cargo*, *Mail* and *Other* manually. Their Total weight is then shown. You will be warned if you try to exceed the Cargo Capacity value that you entered in the *Configuration* during *Aircraft Setup* (see above).

Use the *Random* button to randomly set cargo load or use the slider control to quickly set a cargo load.

### **Fuel Load**

Set *Fuel on Board* to the weight of fuel you will have on board at chocks away. Fuel quantity expressed in Liter or Gallons is shown in the line below.

From this will be subtracted the expected weight of fuel that will be burnt as *Taxi Fuel* during the minutes of taxi that you enter, giving the planned weight of fuel in your tanks at Take-Off.

Again, from this figure is subtracted the planned weight of fuel to be burnt during your trip (*Trip Fuel*), giving a planned *Landing Weight*.

Use the *Estimate* button to let TOPCAT estimate the required fuel requirements for this trip. Fuel calculation is based on:

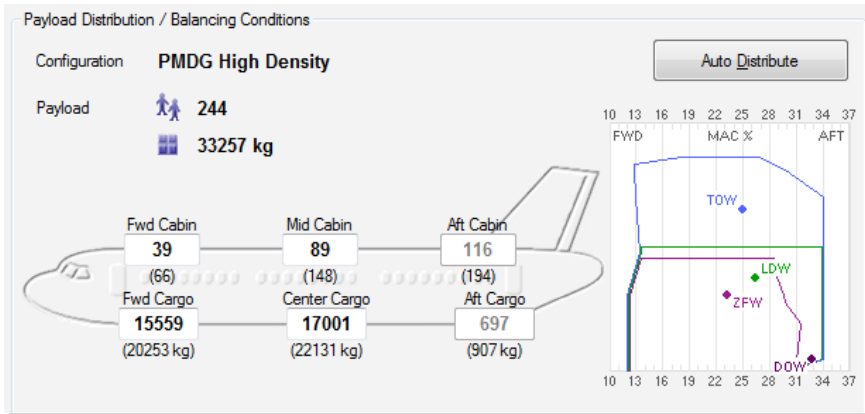
- Trip distance between departure and destination airport as indicated in the *Dist* field
- Flight from Destination to an Alternate airport in a distance of 150NM



- Fuel to hold for 30 minutes overhead Alternate airport

This calculation does not relieve the Pilot-in-Command from an accurate flight planning, but gives a rough overview of the required amount of fuel to be carried for this flight.

### Payload distribution



TOPCAT allows you to distribute passengers and cargo loads into different compartments and holds. Varying payload distribution will change the airplanes Center of Gravity (CoG) and Mean Aerodynamic Chord (MAC).

The *Auto Distribute* button distributes passenger and cargo load evenly in all compartments and holds.

The MAC must be within the manufacturers limits for Take-Off (TOW), landing (LDW) and for the aircraft's zero fuel weight (ZFW). You might need to load ballast to bring the MAC to certified limits.

### Other/Remarks

- Enter your name or initials in the *Prep[ared by]* field.
- Enter the name of the captain in the *PIC (Pilot in Command)* field.



- *Rmk (Remarks)* allows you to add important notes or information to the Loadsheet.

### Weight & Balance Summary

Weight & Balance Summary			
<b>Dry Operating Weight</b>	<b>DOW</b>	<b>124000 kg</b>	
Payload		51104 kg	
<b>Zero Fuel Weight</b>	<b>ZFW</b>	<b>175104 kg</b>	<b>23.3% MAC</b>
Take-Off Fuel		68600 kg	
<b>Take-Off Weight</b>	<b>TOW</b>	<b>243704 kg</b>	<b>25.1% MAC</b>
Trip Fuel		54850 kg	
<b>Landing Weight</b>	<b>LDW</b>	<b>188854 kg</b>	<b>26.4% MAC</b>
<b>Underload 25015 kg (Limited by LDW)</b>		<b>Stab Trim: FMC</b>	

At the foot of *Weight & Balance Summary* is a message area where you will be advised of *Underload* or *Overload* amounts. You should be able to explain the *Underload* amount when asked. You must avoid all *Overloads* as these will adversely affect the airplane’s ability to Take-Off and fly your planned route safely.

To the right the calculated position of the Center of Gravity (CoG) relative to the *Mean Aerodynamic Chord (MAC)* and the *Stabilizer Trim* settings for Take-Off are shown.

Use the *Set Zero Fuel Weight* button to override load figures and manually enter a *Zero Fuel Weight (ZFW)*.

*Note: This will disable Mean Aerodynamic Chord (MAC) and trim calculation.*

### Loadsheet

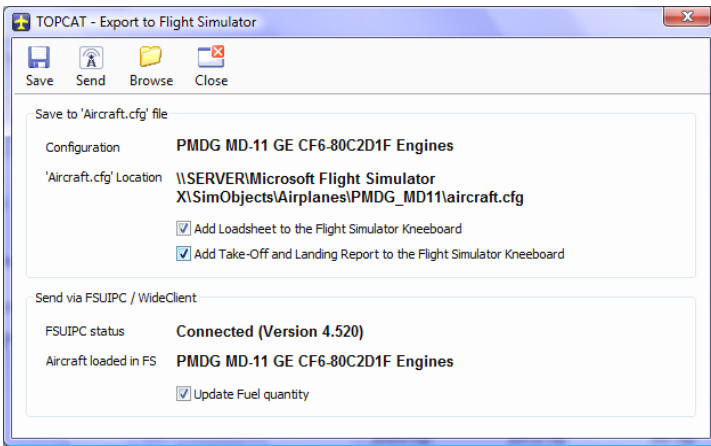
Better not to fly rather than attempt to Take-Off in an airplane so overloaded that it won’t get off the ground. Your airline’s booking system should ensure that the capacities are not exceeded. When you execute your Cockpit Checklist, you will have the *Loadsheet* detailing your various loadings, and you will have to sign that they are accurate, safe and within the maximums specified.



The three buttons at the top of the *Loadsheet* display are *Print*, *Save*, *Email*, *ACARS* and *Close*.

- Pressing the *Print* button will cause your *Loadsheet* to be printed.
- Pressing the *Save* button will enable you to choose a name and location of a file containing your *Loadsheet*.
- Pressing the *Email* button will enable you to send the results by email.
- Pressing the *ACARS* button will enable you to deliver an abbreviated version of the *Loadsheet* via Jeroen Hoppenbrouwers' *ACARS* system directly onto the flight deck.
- Pressing the *Close* button will close the *Loadsheet* window.

### Export to Flight Sim[ulator]



Use the *Export to Flight Sim[ulator]* button to deliver the load and fuel figures directly to Microsoft® Flight Simulator® thus releasing you from using load managers or setting these figures manually



## Save to aircraft.cfg file

If a valid aircraft.cfg file is specified in the aircraft properties (Aircraft / Modify / Microsoft® Flight Simulator® aircraft.cfg file), TOPCAT is able to update this file with the payload data provided in the W & B (Weight & Balance) module.

After updating the aircraft.cfg file, the aircraft must be reloaded in Microsoft® Flight Simulator® for the changes to take effect.

*Note: Make sure that the selected aircraft.cfg file corresponds to the TOPCAT aircraft configuration. Fuel loads are normally not updated (except for some Add-Ons like LDS 767 and PMDG 747/MD11).*

## Send via FSUIPC / WideClient

Send via FSUIPC / WideClient (<http://www.schiratti.com/dowson.html>) allows you to inject payload data from the W & B (Weight & Balance) module on-the-fly into Microsoft® Flight Simulator® without any need to reload the airplane.

*Note: Some Add-Ons (PMDG 747/MD11; for FSX only) inhibit updating of fuel figures via FSUIPC. In that case you must set them manually.*

## Browse

The *Browse* button allows you to quickly change the assigned 'aircraft.cfg' file. The changes will permanently be stored in your aircraft database.



## Take-Off

Setting powerful jet engines to Take-Off thrust is extremely dangerous unless you have carefully planned both what you want to happen and, perhaps even more important, what you will do if things start to go wrong. Be prepared!

During the calculations for your Take-Off performance, you will specify the *Runway* from which you will take off, the *Environmental Conditions*, your aircraft's *Take-Off Configuration* and any *Runway Shortening* that is currently in effect.

### Aircraft

The aircraft box reminds you of the *Registration*, *Aircraft* and *Engine Type* and *Units* for this Trip.



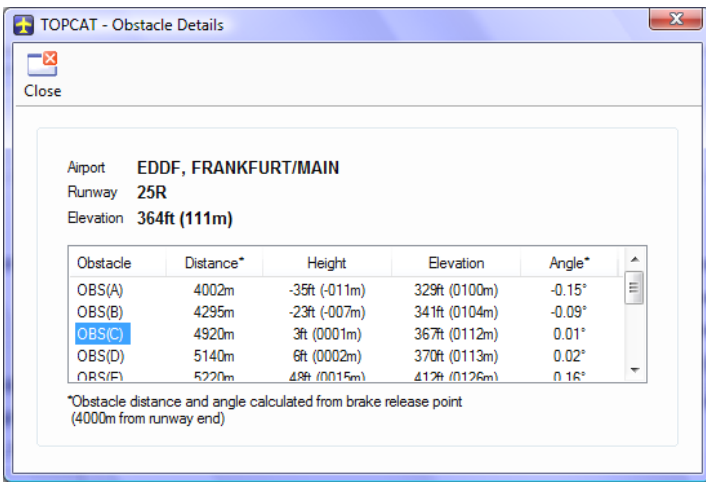
## Airport & Runway

In the *Airport & Runway* box, specify your departure Airport ICAO or IATA code in the same manner as you did during *Trip Setup*.

Choose the Take-Off Runway that you will use. A drop-down box is displayed if you click the down arrow to list all the available runways including intersections at the specified airport.

The remainder of the *Airport & Runway* box will now contain the specification of the chosen runway. Check to ensure that the runway specification agrees with your runway chart.

- Heading is the magnetic heading of the runway. Slope is the percentage gradient of the runway. A '+' signifies that the Take-Off slope is uphill and a '-' signifies that the Take-Off slope is downhill.
- The number of *Obstacles* in the database for the selected runway. Use the *Detail* button for more detailed information (only enabled if at least one obstacle is present in the database for the particular runway).



- *Runway Length* and *Width* are shown in your chosen measurement unit.



- A *Clearway* is an area beyond the runway, not less than 500 feet wide, centrally located about the extended centreline of the runway. The clearway is expressed in terms of a clearway plane, extending from the end of the runway with an upward slope not exceeding 1.25%, above which no object nor does any terrain protrude.

However, threshold lights may protrude above the plane if their height above the end of the runway is 26 inches or less and if they are located to each side of the runway.

- A *Stopway* is an area beyond the Take-Off runway, no less wide than the runway and centred on the extended centreline of the runway, able to support the airplane during an aborted Take-Off, without causing structural damage to the airplane, and designated for use in decelerating the airplane during an aborted Take-Off
- *TORA* (Take-Off run available) is the runway length declared available and suitable for the ground run of an airplane taking off.
- *TODA* (Take-Off distance available) is the *TORA* plus the length of any remaining runway or clearway beyond the far end of the *TORA*. The full length of *TODA* may not be usable for all Take-Offs because of obstacles in the departure area. The usable *TODA* length is aircraft performance dependent and must be determined by the aircraft operator before each Take-Off and requires knowledge of the location of each controlling obstacle in the departure area.
- *ASDA* (accelerate/stop distance available) is the runway plus stopway length declared available and suitable for the acceleration and deceleration of an airplane aborting a Take-Off.
- *Elevation* shows the elevation of the runway above mean sea level (MSL).
- The window at the bottom of the Airport/Runway box shows the Engine-Out Departure Procedure (*EOSID*) to be used in case of an engine failure after Take-Off.



## Conditions

In the *Conditions* box are shown *Wind Component*, *Temperature*, *QNH* and *Runway Condition*.

Into *Wind*, you must enter the current magnetic wind direction and speed. For example, '270/03' indicates that the wind is coming from 270°, which is from the west, at 3 knots.

To enter a wind given in meters per second (mps) add an 'M' after the wind speed. For example, '360/06M' indicates that the wind is coming from north with 6 meters per second. Metric wind speed will automatically be converted to knots.

To the right will be displayed the resultant head or tail wind *Component*. You enter the current *Temperature* into the next box. To the right will be displayed the highest outside air temperature permitted for Take-Off (environmental temperature limit).

Either enter the *QNH* in *hectopascal* or the *altimeter setting* in *inches of mercury*.

Press the *Update* button to update weather conditions with the selected weather source (*NOAA*, *IVAO*, *VATSIM* or *ActiveSky*). This will cause TOPCAT to automatically insert the current wind, temperature and airport air pressure.

*Runway Condition* can affect the pavement friction qualities and therefore stopping distances in the event of you aborting a Take-Off. Choose the current *Runway Condition* from the associated dropdown box.

## Configuration

To set *Take-Off Weight* you should either press *Auto[matic]* or *Max[imum]*. Pressing *Auto* will set your Take-Off weight to that calculated on the *Loading page* (see above). Pressing *Max* will set your Take-Off weight to *Maximum Structural Take-Off Weight*.

Set *Flaps Config[uration]* to one of the values contained in the dropdown box. *Optimum* will set best flaps for minimum Take-Off thrust required. Your airline may have operating standards for the value to be set.



Set *Thrust* Config[uration] to one of the values contained in the dropdown box. *Optimum* will set optimum de-rate resulting in minimum engine thrust. Again, your airline may have operating standards for the value to be set.

Set *Air Conditioning* to one of the values presented in the dropdown box. Air condition packs drain a lot of engine energy, especially during Take-Off. Your airline may have standard procedures that mandate how air condition packs should be set for Take-Off.

Select appropriate *Anti Ice* configuration. *Anti-ice* uses significant amounts of engine energy so should not be used unless necessary. Ice can very easily form on cold surfaces and endanger your Take-Off.

### **Temporary Runway Shortening**

Temporary runway shortening can be declared for a number of engineering or environmental reasons. Their specification will cause alteration to the usable runway length. NOTAMS (notices to airmen) will be published for an airport if runway shortening is in effect

In the '*From Runway Head*' and '*From Runway End*' fields specify the distance of the shortening, if any. Use the *Clear* button the reset these figures to zero.

### **Inoperative Items**

For inoperative items of aircraft equipment that will have an adverse effect on your Take-Off performance, you have the opportunity to state their inoperability. Press the *Edit* button and check each of the inoperable items. For each inoperable item, you must also execute the appropriate Abnormal Lists to ensure that you take the required actions. *Clear All* resets all malfunctions.

### **Take-Off Performance Calculation**

Pressing the *Compute* button will cause TOPCAT to calculate the Take-Off performance. The data are displayed to the bottom-right of the Take-Off window. The details in the Take-Off window show outside air temperature (OAT) or selected



temperature (T-Sel), Maximum Take-Off Weight (MTOW), Limit, V1, VR, V2, Margin and N1/EPR.

Perf. Limit Weight: 290000 kg				FLAPS 10 NORM T/O				
OAT	Limit (kg)	Code	V1	VR	V2	Margin	N1	
-7°C	285990	MTOW	149-170	170	178	1584m	105.3%	
FLEX	Limit (kg)	Code	V1	VR	V2	Margin	N1	▲
+57°C	250549	FIELD	160-164	177	183	244m	96.4%	
+58°C	248669	CLIMB	160-163	177	183	205m	96.2%	
+59°C	246170	CLIMB	160-161	177	183	165m	95.9%	▼

- OAT shows the temperature you entered in the Conditions box of the Take-Off window.
- The box below shows a range of *Assumed Temperatures* (if available) calculated by TOPCAT.
- For the OAT, you are given the maximum Take-Off weight for the runway conditions.
- *Limit* shows the most limiting weight for given runway conditions.
- *Code* shows the restricting limit.
- *V1* shows you a range of decision speeds.
- *VR* shows your rotation speed.
- *V2* shows your one-engine out Take-Off safety speed.
- *Margin* shows the remaining distance to the end of the runway (or stopway, if available) in case of an aborted Take-Off at V1.
- *N1/EPR* is the engines power setting that must be achieved for a successful Take-Off as planned.

You may remember that you set your airlines Take-Off thrust policy for the aircraft in the *Aircraft Database* (see above).



If your airline has authorised the use of assumed/flex temperature Take-Offs, the range of temperatures listed in the T-Sel column shows the result of calculations by TOPCAT of varying ambient temperatures and their effect on Take-Off performance for the aircraft.

The effect of raising the assumed temperature for Take-Off above that of ambient temperature is to lengthen the Take-Off roll (and therefore to reduce the margin) by reducing the engine N1/EPR. In effect you are telling the flight management system to set less Take-Off power at the expense of a longer Take-Off roll without compromising on the Take-Off speed.

This will put less strain on the engines and prolong their service life and increase reliability. If your airline policy allows, you can select an assumed temperature for your Take-Off that is above the current OAT.

You have now specified all of the information required for TOPCAT to calculate your Take-Off data. Complete your cockpit preparation procedure using the outputs from these calculations.

### **Individual Runway Table (IRT)**

Pressing the *Runway Table* button will cause TOPCAT to generate an *Individual Runway Table (IRT)*. Before using this function, select the desired *Thrust/Flaps Configuration* and *Air Conditioning/Anti Ice setting*.

As in real-life operations, this table can be used to quickly determine your *Maximum Take-Off Weight (MTOW)* and the respective Take-Off speeds (V1, VR, and V2) at a specific airport and runway at various wind, temperature and pressure conditions.

***And finally, have a pleasant and SAFE flight!***



## Landing

**Aircraft**

Registration: **N-5678**  
Type: **MD-11 CF6-80C2D1F**  
Weight Units: **Kilograms (kg)**

**Conditions**

Wind (Dir/Speed): **350/06** TAIL 05 (X 03)  
Temperature (°C): **.5** +54°C MAX  
QNH (hPa): **1012** ALT 29.89  
Runway Condition: **DRY**  
Weather Source: **IVAO** Update

**Configuration**

Landing Weight (kg): **188854** Auto Max  
Flaps Config: **50/EXT**  
Air Conditioning: **ON**  
Anti Ice: **OFF**  
Landing Mode: **MANUAL**  
Braking Mode: **MANUAL**  
Approach Speed Increase (kts): **0**

**Airport & Runway**

Airport: **KJFK** **JOHN F KENNEDY INTL**  
Runway: **13R** Length: **4442m** L.D.A. **4442m**  
Heading: **135°** Width: **46m** Elevation: **13ft (4m)**  
Slope: **+0.0%**

**Calculation Method**

**Dispatch** **In-Flight**

**Temporary Runway Shortening**

Landing Distance Reduction (m):   
Clear

**Inoperative Items**

**NO REVERSE**  
Edit... Clear All

**Perf. Limit Weight (In-Flight)** **285807 kg**

Limit Code		CLIMB
Reference Speed	VRef	146kts
Approach Speed	VApp	151kts
Landing Distance Required	LDR	2567m
Landing Distance (Actual)		1540m
Landing Distance (Remaining)		2902m

Compute

This product is licensed TOPCAT DATABASE (REV. 03) ACARS: Online (4) 01JAN00 00:00:00 UTC

During the calculations for your landing performance, you will specify the runway on which you will land, the environmental conditions, your aircraft landing configuration, the calculation method, any runway shortening that is currently in effect and any inoperative items.

### Aircraft

The aircraft box reminds you of the *Registration*, *Aircraft* and *Engine Type* and *Units* for this Trip.

### Airport & Runway

In the *Airport & Runway* box, specify your destination Airport ICAO or IATA code in the same manner as you did during Take-Off. Choose the *Landing Runway* that you will use.



A drop-down box is displayed if you click the down arrow to list all the available runways at the specified airport. The remainder of the Airport & Runway box will now contain the specification of the chosen runway. Check to ensure that the runway specification agrees with your runway chart.

Heading is the magnetic heading of the runway. Slope is the percentage gradient of the runway. A '+' signifies that the Take-Off slope is uphill and a '-' signifies that the Take-Off slope is downhill. Runway Length and Width are shown in your chosen measurement unit. LDA (landing distance available) is the runway length declared available and suitable for a landing airplane. Elevation shows the elevation of the runway above mean sea level (MSL).

### **Conditions**

In the *Conditions* box are shown *Wind Component*, *Temperature*, *QNH* and *Runway Condition*.

Into *Wind*, you must enter the current magnetic wind direction and speed. For example, '270/03' indicates that the wind is coming from 270°, which is from the west, at 3 knots. To enter a wind given in meters per second (mps) add an 'M' after the wind speed. For example, '360/06M' indicates that the wind is coming from north with 6 meters per second. Metric wind speed will automatically be converted to knots.

To the right will be displayed the resultant head or tail wind *Component*. You enter the current *Temperature* into the next box. To the right will be displayed the highest outside air temperature permitted for landing (environmental temperature limit).

Either enter the *QNH* in *hectopascal* or the *altimeter setting* in *inches of mercury*.

Press the *Update* button to update weather conditions with the selected weather source (*NOAA*, *IVAO*, *VATSIM* or *ActiveSky*). This will cause TOPCAT to automatically insert the current wind, temperature and airport air pressure.

*Runway Condition* can affect the pavement friction qualities and therefore stopping distances for landing. Choose the current *Runway Condition* from the associated dropdown box.



## Configuration

To set *Landing Weight* you should either press *Auto[matic]* or *Max[imum]*. Pressing *Auto* will set your landing weight to that calculated on the *W & B (Weight & Balance)* page.

Pressing *Max* will set your Take-Off weight to *Maximum Structural Landing Weight*.

Set *Flaps Config[uration]* to one of the values contained in the dropdown box. Your airline may have operating standards for the value to be set.

Set *Air Conditioning* to one of the values presented in the dropdown box. Air condition packs drain a lot of engine energy in case of a go-around. Your airline may have standard procedures that mandate how air condition packs should be set for landing.

Set *Anti Ice* as required. Extreme care must be taken when descending from en route flight levels, where the wings and fuel may be cold-soaked, into warmer lower levels where condensation may accumulate as ice.

*Landing Mode* can be set as required. Generally, *AUTOLAND* assumes a later touch-down point and increases *Landing Distance Required (LDR)*. Each setting chosen will affect the stopping distance of the aircraft on touchdown.

Ensure that you choose a value that computes to a safe stopping distance.

On approach, you will have determined your *Approach Speed (VApp)*. If you have reason to increase this value (e.g. gusts, turbulences, windshear), then set *Approach Speed Increase (kts)* by the amount you wish to increase it.

## Calculation Method

You have the ability to calculate your landing data at the point of *Dispatch* and/or when *In-Flight* (usually during descent planning).

You must ensure that, before making an airport approach, you have used the *In-Flight* option to calculate your landing data. Your airline Dispatch Department will normally be the users of the *Dispatch* option, if used at all.



For landing performance calculations, a *Landing Distance Required (LDR)* is established. The *Landing Distance Available (LDA)* must be equal or greater than the *Landing Distance Required (LDR)*.

For calculation of the *Landing Distance Required (LDR)* the following rules usually apply:

- *Dispatch (Pre-flight)*: Actual, un-factored landing distance (from 50 feet above runway to a complete stop) including malfunctions (if any) with maximum braking and no approach speed increase factored with 1.67 (jet aircraft) or 1.43 (propeller aircraft).

In case of a runway forecasted or reported to be wet or contaminated an additional factor of 1.15 is applied.

- *In-Flight*: The higher of:
  - The distance calculated as above (*Dispatch*)
  - Actual, un-factored landing distance (from 50 feet above runway to a complete stop) including malfunctions (if any) with either manual or automatic braking and approach speed increase (if any) without any margin.

### **Temporary Runway Shortening**

You must know, before landing, whether your chosen runway has been shortened. Both your runway approach chart and NOTAMS (notices to airmen) will notify you of runway shortenings and their effective dates.

Enter a *Landing Distance Reduction* value to indicate the shortening. Use the *Clear* button to reset this value to zero.

### **Inoperative Items**

For inoperative items of aircraft equipment that will have an adverse effect on your landing performance, you have the opportunity to state their inoperability. Press the *Edit* button and check each of the inoperable items. For each inoperable item, you



must also execute the appropriate Abnormal Lists to ensure that you take the required actions.

*Clear All* resets all malfunctions.

## Landing Performance Calculation

Having entered all of the required data, you can now press *Compute* so that TOPCAT can calculate your *Landing Data*. You will receive a summary of your landing data at the bottom of the Landing window showing *Performance Limit Weight*, *Limit Code*, *Reference Speed*, *Approach Speed*, *Landing Distance Required (LDR)*, *Landing Distance (Actual)* and *Landing Distance (Remaining)*.

If you press *Landing Report* you will be shown the printable *Landing Performance Report*.

- *Perf[ormance] Limit Weight* is the calculated maximum weight at which you can safely land at the current airport temperature and airport pressure altitude.
- *Reference Speed* is the VRef for your approach (normally  $1.3 \times VS1G$ )
- *Approach Speed* is the VRef corrected for wind component plus the value of Approach Speed Increase specified.

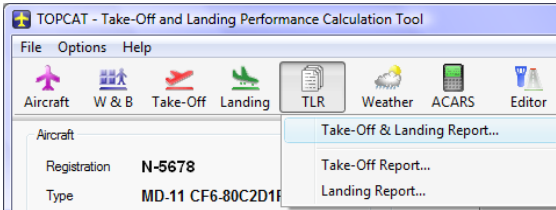
A speed increase should be specified in gusty conditions or when wind shears are expected during approach.

- *Landing Distance Required (LDR)* is the runway length legally required with actual *Landing Weight* at current airport temperature and airport pressure altitude (see *Calculation Method*).
- *Landing Distance (Actual)* is the un-factored, calculated distance required to bring the aircraft from 50 feet to a complete stop
- *Landing Distance (Remaining)* is the *Landing Distance Available (LDA)* less the *Landing Distance (Actual)*, i.e. the Margin.

***Landing has been described as performing a carefully controlled crash.***



## TLR (Take-Off & Landing Report)



The *Take-Off & Landing Report* button will allow you to calculate the necessary Take-Off and/or landing performance data for the airports specified in the *From* and *To* field.

The Take-Off and/or Landing Report feature is especially useful if a computer is not readily available on the (virtual) flight deck. All required data for Take-Off and Landing can be assembled in a single document so that no further calculations are required afterwards.

TOPCAT allows you to produce such reports either for Take-Off, Landing or both.

*Note: For a detailed description of the report format see 'Annex / Take-Off and Landing Report description'*



### Take-Off & Landing Report Setup

Select the planned runway/intersection, conditions and planned weights. *Additional Runways* can be selected on the right side (the planned runway is always included in the report, even if not selected in the *Additional Runways* field).

Click the *All*, *None* and *Full length* button to quickly select the needed runways. Use the *Min[imum] runway length* function to filter runways/intersections depending on their length.

Use the *Wx Update* button to show the latest METAR/TAF for the selected airports. Weather conditions (Wind, temperature, pressure) are automatically updated, but can be manually adjusted as required.

After selecting the required report options, click *Generate* to produce the *Take-Off and Landing Report*.



## Weather

TOPCAT - Weather Download

Download Close

Weather Data

Provider **NOAA** Browse...

Source National Oceanic and Atmospheric Administration  
http://www.noaa.org

Report Types

METAR  
 METAR + TAF

Weather Stations

Include Departure, Destination and Alternate Weather  
 Update weather conditions on Take-Off and Landing page

EDDF KFRG KJFK K3C8

Additional Airport(s)  
K3C8, KEWR Add... Clear All

Enter airport ICAO/IATA identifier(s) separated by space

Weather briefings can be obtained by pressing the *Weather* tab. Select the desired weather data source, *the type(s) of reports and any weather station*.

The additional aerodromes are likely to be those aerodromes that you fly near and which you may have to make use of in case of a diversion or an emergency.

You can specify whether the METAR Source (from the French "message d'observation météorologique régulière pour l'aviation,") is a format for reporting weather information) is to be from:

- NOAA (the US National Oceanic and Atmospheric Administration)



- *I*VAO (International Virtual Aviation Organisation)
- *V*ATSIM (the Virtual Air Traffic Flight Simulation Network).
- *A*ctiveSky (<http://www.hifisim.com>)

You can specify the Report Types to be one or more of the following formats:

- METAR (actual weather)
- TAF/FT (forecast valid for 24 hours)

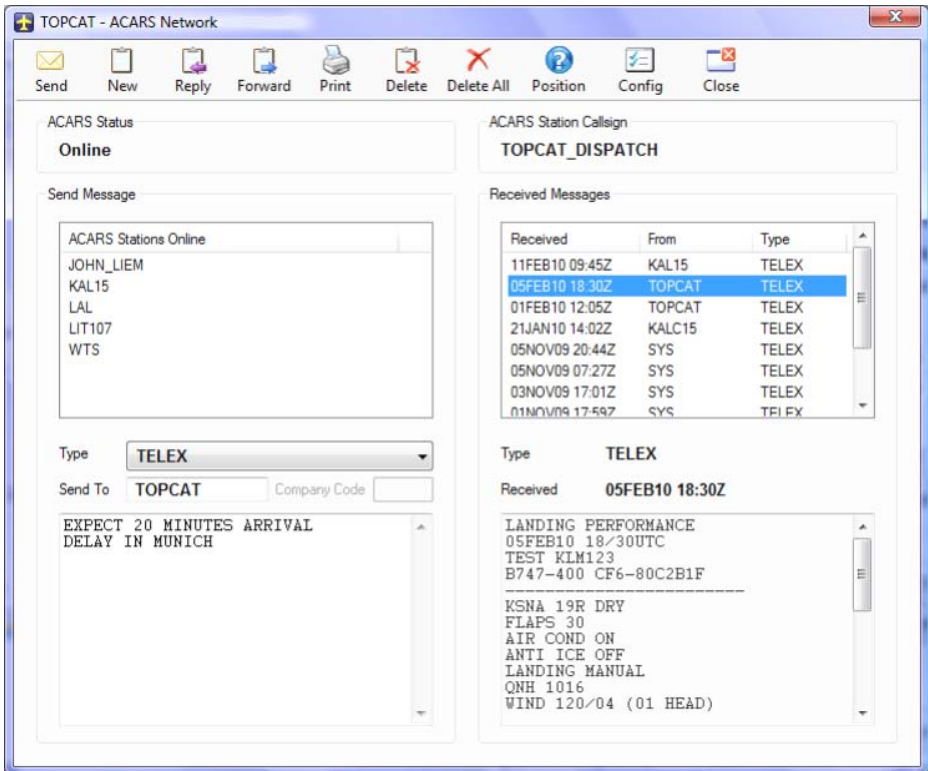
Pressing the *Download* button will cause the weather to be downloaded and presented as a *Weather Briefing*.

Check the *Update weather conditions on Take-Off and Landing page* option to automatically set weather conditions on the respective tabs.

Weather data can be directly sent to an ACARS station by pressing the *ACARS* button.



## ACARS Network



The TOPCAT messaging function uses Jeroen Hoppenbrouwers' ACARS system for information transfer between ground and airborne stations. Before using ACARS, it must be setup in *ACARS Configuration*.

### Received Messages

The *Received Messages* frame shows all inbox messages with receiving date and time, sender and message type. Unread messages are shown bold.

Message type can either be *Telex* (for Telex-type messages) or *Position* (for response to a *Pos[ition] Req[est]*).



*Note: The TOPCAT ACARS client can only receive 'Telex' or 'Position' messages. Other messages are ignored.*

Use the *Reply* button to reply to a telex message or use the *Forward* button to forward the message to another station.

## **Send Message**

Enter the identification of the receiving station in the 'To' field or select a station currently online from the *ACARS Stations Online* box. Choose the desired message type (*Telex, Load Sheet, Take-Off Data, Landing Data or Arrival Information*).

Telex messages are sent directly to the recipient. Messages other than *Telex* are stored on the ACARS server for later retrieval from the receiving station.

*Note: For non-Telex messages a Company Code, matching the Company Code of the receiving station must be provided (e.g. for STV123 the Company Code is STV).*

Pressing the *Position* button will return a message with flight operational information of the recipient like position, altitude, speed, wind and temperature.

*Note: Only aircraft stations will respond to a Position Request message.*



## Editor

TOPCAT - Airport & Runway Editor

Save Reset Close

**Airport**

ICAO identifier: EDDF Add Delete

IATA identifier: FRA Latitude: 50.03

Elev. (ft): 364 Longitude: 8.57

Name: FRANKFURT/MAIN

**Units of Measurement**

Lengths: Meter (m)

Heights: Feet (ft)

**Intersections**

INT	TORA	TODA	ASDA
LE	3940m	4000m	3940m

Intersection: TORA (m) Add Delete

**Runway - Meter (m)**

Runway: 07L Length: 4000 Clearway: 60 Add Runway

Elev. (ft): 329 Width: 60 Stopway: 0 Delete Runway

Heading: 069 T.O.R.A.: 4000 T.O.D.A.: 4060 Change Identifier

Slope (%): +0.3 L.D.A.: 4000 A.S.D.A.: 4000

Engine Out: CLIMB STRAIGHT AHEAD TO 1900FT. TURN LEFT TO MTR (110.0) CLIMBING TO 4000FT AND HOLD (241/R).

**Obstacles**

Obst.	Dist. (End)	Height	Angle
OBS(A)	00002m	0039ft	0.15°
OBS(B)	00145m	0042ft	0.18°
OBS(C)	00150m	0046ft	0.19°
OBS(D)	00350m	0046ft	0.19°

Distance (m) Height above runway (ft)

From end of TORA  From beginning of TORA Add Delete

Pressing the *Editor* tab provides you with the *Airport & Runway Editor* window. As this states, you can alter, add and/or delete to the existing database of airports and runways.

For airports, you can specify *Airport* ICAO and IATA identifier, *Name* and *Elevation*. You can specify whether your *Lengths* and *Heights* are in *meters* or *feet*.

For runways, you can specify *Runway ID* (*identifier*), *Elevation*, *Heading*, *Slope*, *Length*, *Width*, *TORA*, *LDA*, *Clearway*, *Stopway*, *TODA* and *ASDA*. *Engine-Out procedures* (*EOSIDS*), *Runway Intersections* and *Obstacles* can also be added or deleted.

Pressing *Save* will save the changes that you have made. Pressing *Reset* will undo the changes that you have made on the window but not committed to the database.



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## Chapter 5

### Acknowledgments and Thanks





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## **Acknowledgments and Thanks**

Without the hard work and co-operating of the following people, our efforts to develop TOPCAT would not have born fruit:

**Richard McDonald Woods** for the development of this manual.

**Jeroen Hoppenbrouwers** for help in interfacing TOPCAT with ACARS and with permission to quote from his ACARS documentation.

**Carl Avari-Cooper** for kind permission to use his aircraft images.

**Judith Blaschegg** for supporting me adapting this manual

**Douglas Snow** for his technical advice and support

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## Chapter 6

### Annex





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# Sample Loadsheet

L O A D S H E E T	CHECKED	APPROVED	DATE	TIME
ALL WEIGHTS IN KILOGRAMS	.....	.....	29JUN09	0922

REMARKS/ PREPARED BY THE TOPCAT TEAM

FROM/TO	FLIGHT	A/C REG	A/C TYPE	CONFIG
EHAM/KJFK	KLM246	N-12345	B767-300ER/CF6-80C2B7F	C48 Y206

LOAD IN COMPARTMENTS	WEIGHT	DISTRIBUTION
	20839	1/6628 2/4635 3/4485 4/3471 5/1620

PASSENGER/CABIN BAG	16929	AD/190 C/21 I/23	TTL 211+23
---------------------	-------	------------------	------------

TOTAL PAYLOAD	37768			LAST MINUTE CHANGES
DRY OPERATING WEIGHT	89358			DEST SPEC CL/CPT +/- WEIGHT
ZERO FUEL WEIGHT ACTUAL	127126	MAX	130635 L	
TAKE OFF FUEL	48700			
TAKE OFF WEIGHT ACTUAL	175826	MAX	185066	
TRIP FUEL	42040			
LANDING WEIGHT ACTUAL	133786	MAX	145150	
TAXI OUT FUEL	200			

UNDERLOAD BEFORE L.M.C.	3509	LIMITED BY ZFW	LMC TOTAL	+ / -
-------------------------	------	----------------	-----------	-------

BALANCING/TRIM CONDITIONS  
 MACZFW 18.36%  
 MACTOW 21.11% STAB TRIM: 5.3  
 MACLDW 19.56%

MAC LIMITS	ZFW	FWD 12.88%	AFT 31.68%
	TOW	FWD 10.50%	AFT 37.81%
	LDW	FWD 12.04%	AFT 34.06%

TRIM BY CABIN AREA  
 A14.B69.C62.D66

CAPTAINS INFORMATION/NOTES  
 STD WEIGHTS USED ADULT/85 CHILD/36 INFANT/1  
 BLOCK FUEL/ 48900 (60557 LITER)  
 LANDG FUEL/ 6660  
 TAXI TIME 10 MIN

SELCAL/QS-BP

CREATED WITH TOPCAT 2.55.B5 (24JUN09)  
 AIRCRAFT FILE VERSION 1.20 (23JUN09)

END LOADSHEET KLM246 EHAM-KJFK



# Sample Take-Off Report

TAKEOFF REPORT FDX345J EDDH  
 TOPCAT 2.59 130CT09 10:56Z  
 A/C N-12345 B767-300ER CF6-80C2B7F

ALL WEIGHTS IN KILOGRAMS

APT PRWY POAT PWIND PQNH PMRTW FLP CONF THRUST V1 VR V2 PTOW  
 EDDH 33 +11°C 040/04 1028 162000 FLAPS 5 D-TO +52°C 151 156 161 161799

RMKS SPEED/FLAPS SCHEDULE: VREF30=157 F5=177 F1=197 UP=217 CLEAN=237

-----  
 RWY/INT OAT WIND QNH RWY COND V1 VR V2 THRUST/FLAPS CONFIG

----- REDUCED - DRY - OPT FLAPS - D-TO - A/C ON - A/I OFF -----  
 RWY 05 RWY 15 RWY 23  
 3250 M 3666 M 3250 M  
 D-TO HW04 D-TO TW01 D-TO TW04  
 AT N1 FLAPS 15 AT N1 FLAPS 5 AT N1 FLAPS 5  
 +50 97.0 157379 044-47-53 +56 95.7 155143 C48-54-59 +50 97.0 157941 048-54-60  
 +48 97.4 159656 045-48-54 +54 96.1 158000 C49-55-60 +48 97.4 160231 049-55-61  
 /+46 97.8 161933 046-49-55 /+52 96.5 162000 C51-57-62 /+46 97.8 162521 050-56-62  
 +44 98.3 164210 047-50-56 +50 97.0 166000 C53-59-64 +44 98.3 164811 051-57-63  
 +42 98.7 166487 047-51-57 +48 97.4 170000 C55-60-66 +42 98.7 167101 052-58-65  
 HW/10 KT +820 0 +6626  
 TW/15 KT -18771 -3441 -13259

RWY 23/AW RWY 33 RWY 33/IN  
 3218 M 3666 M 3350 M  
 D-TO TW04 D-TO HW01 D-TO HW01  
 AT N1 FLAPS 5 AT N1 FLAPS 5 AT N1 FLAPS 5  
 +50 97.0 157426 047-54-60 +56 95.7 155143 C49-54-59 +56 95.7 155143 C49-54-59  
 +48 97.4 159713 048-55-61 +54 96.1 158000 C50-55-60 +54 96.1 158000 C50-55-60  
 /+46 97.8 162001 049-56-62 /+52 96.5 162000 C51-57-62 /+52 96.5 162000 C51-57-62  
 +44 98.3 164288 050-57-63 +50 97.0 166000 C53-59-64 +50 97.0 166000 C53-59-64  
 +42 98.7 166575 051-58-64 +48 97.4 170000 C55-60-66 +48 97.4 170000 C55-60-66  
 HW/10 KT +6614 0 0  
 TW/15 KT -13259 -3372 -8518

\*\*\*\*\*  
 \* MAX TAKE-OFF WEIGHT MUST NOT EXCEED MAX CERT TAKE-OFF WEIGHT OF 185066 KG \*  
 \*\*\*\*\*

----- SPECIAL ENG FAIL TAKEOFF PROCEDURES -----

RWY LENGTH  
 05 3250M LT TO 'LBE' 115.1 (054 INBD,RT)  
 15 3666M AT 3.5 DME 'ALF' 115.8 LT TO 'HAM' 113.1 (009 INBD,RT)  
 23 3250M RT TO 'HAM' 113.1 (009 INBD,RT)  
 33 3666M CLIMB STRAIGHT AHEAD TO GT LCTR (323.0). WHEN PASSING 2000' TURN RIGHT  
 TO HAM VORDME (113.10) CLIMBING TO 3000' AND HOLD (INBD 009, RT)

END TAKE-OFF REPORT FDX345J EDDH



# Sample Landing Report

LANDING REPORT FDX345J TNCM  
 TOPCAT 2.59 13OCT09 10:52Z  
 A/C N-12345 B767-300ER CF6-80C2B7F

ALL WEIGHTS IN KILOGRAMS

APT	PRWY	POAT	PWIND	PQNH	PMRLW	FLP CONF	VREF	VAPP	PLDW
TNCM	09	+11°C	040/04	1028	190000	FLAPS 30	141	146	138500

-----  
 RWY/INT    OAT    WIND    QNH    RWY COND    VREF    VAPP    FLAPS    CONFIG/COND

----- DISPATCH LIMITS - DRY - A/C PACKS ON - A/I OFF -----  
 \*\*\* NORM VIS / LOW VIS \*\*\*

	RWY 09		RWY 10		RWY 27		RWY 28	
	2180 M	HW02	2150 M	HW02	2180 M	TW02	2165 M	TW02
	OAT	FLAPS 30	FLAPS 30	FLAPS 30	FLAPS 30	FLAPS 30	FLAPS 30	FLAPS 30
	+15	175570F/158477F	174293F/156885F	170920F/153220F	170059F/152569F	170059F/152569F	170059F/152569F	170059F/152569F
	+13	175570F/158477F	174293F/156885F	170920F/153220F	170059F/152569F	170059F/152569F	170059F/152569F	170059F/152569F
	/ +11	175570F/158477F	/ 174293F/156885F	/ 170920F/153220F	/ 170059F/152569F	/ 170059F/152569F	/ 170059F/152569F	/ 170059F/152569F
	+9	175570F/158477F	174293F/156885F	170920F/153220F	170059F/152569F	170059F/152569F	170059F/152569F	170059F/152569F
	+7	175570F/158477F	174293F/156885F	170920F/153220F	170059F/152569F	170059F/152569F	170059F/152569F	170059F/152569F
HW/10	KT	+3564/ +5166	+3555/ +5023	+8214/ +10423	+8444/ +10221	+8444/ +10221	+8444/ +10221	+8444/ +10221
TW/15	KT	-28357/ -36259	-29682/ -36931	-23707/ -31002	-24125/ -31463	-24125/ -31463	-24125/ -31463	-24125/ -31463

\*\*\*\*\*  
 \*                    MAX LANDING WEIGHT MUST NOT EXCEED MAX CERT LANDING WEIGHT OF 140614 KG                    \*  
 \*\*\*\*\*

----- REQUIRED LDG DIST - NORM VIS - FLAPS 30 - A/C PACKS ON - A/I OFF -----  
 \*\*\* VALID FOR ALL RWYS AT TNCM. BASED ON NO WIND \*\*\*

LDW	DRY	WET	CONTAMIN.
142600	1726M	1985M	1985M
141200	1712M	1969M	1969M
139800	1697M	1952M	1952M
/138500	/ 1684M	/ 1936M	/ 1936M
137000	1668M	1919M	1919M
135600	1654M	1902M	1902M
134200	1639M	1885M	1885M
HW/10	KT	-95M	-110M
TW/15	KT	+404M	+464M

----- AUTOBRAKE LDG DIST - DRY - FLAPS 30 - A/C PACKS ON - A/I OFF -----  
 \*\*\* VALID FOR ALL RWYS AT TNCM. BASED ON NO WIND \*\*\*

LDW	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO MAX
141200	2714M	2222M	1911M	1599M	1288M
139800	2687M	2201M	1893M	1586M	1278M
/138500	/ 2667M	/ 2184M	/ 1880M	/ 1575M	/ 1270M
137000	2643M	2164M	1864M	1562M	1261M
135600	2620M	2146M	1849M	1550M	1252M
134200	2598M	2128M	1834M	1539M	1244M
HW/10	KT	0M	0M	0M	0M
TW/15	KT	+526M	+434M	+366M	+206M

END LANDING REPORT FDX345J TNCM 13OCT09

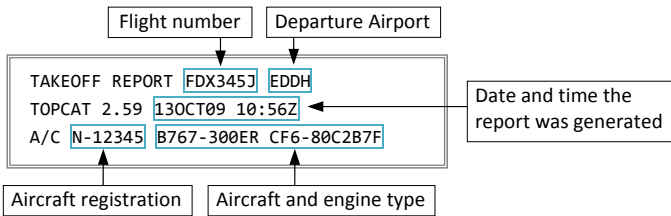


## Take-Off and Landing Report - Description

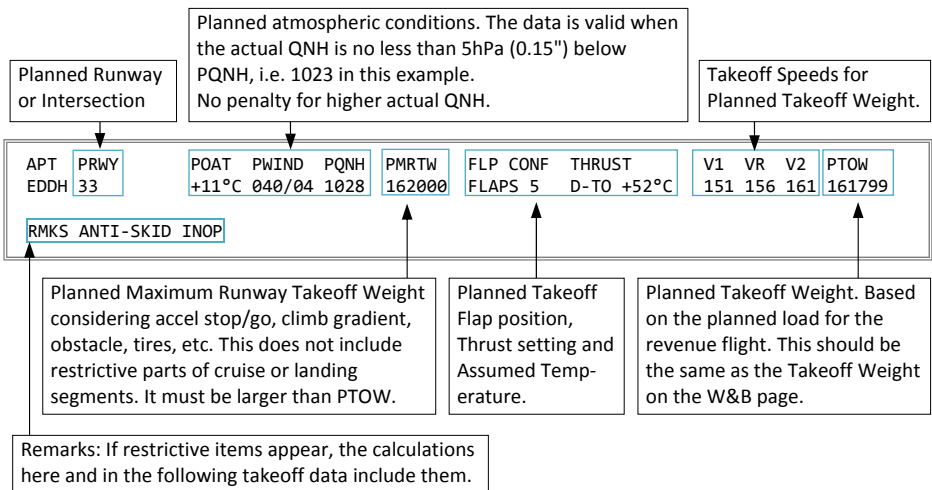
The Take-Off and/or Landing Report feature is especially useful if a computer is not readily available on the (virtual) flight deck. All required data for Take-Off and Landing can be assembled in a single document so that no further calculations are required afterwards. TOPCAT allows you to produce such reports either for Take-Off, Landing or both.

The different data blocks cover variations in atmospheric conditions, different runways and planned weights. Due to the variety of information on the report, a recalculation is rarely required.

### Report Header



### Planned Data (Take-Off)





If actual conditions are the same as Planned Data, then no more calculations are necessary. However, this rarely occurs. If not, then proceed to the blocks of data below the Planned Data that correspond to the actual runway, configuration, and atmospheric conditions.

If some performance conditions change during flight preparation or while the crew is taxiing, it can be handled by either of two methods:

- If the new conditions, such as OAT or Wind, are covered by one of the blocks of takeoff data, the crew can make a new calculation without reference to TOPCAT.
- However, if the new condition is not covered by one of the blocks of takeoff data, a new calculation is required. In this case, the crew will record the new information in the revision data row.

-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
RWY/INT	OAT	WIND	QNH	RWY COND	V1	VR	V2	THRUST/FLAPS	CONFIG

If the actual QNH is higher than planned, i.e. the air is more dense, then actual performance will be better than planned and no recalculation is necessary.

If the actual QNH is lower than planned QNH, i.e. the air is less dense, then performance will be decreased. TOPCAT performance allows an actual QNH variation of 5hPa (0.15" Hg) lower than planned QNH without requiring a recalculation.

If the QNH variation exceeds this amount, then a recalculation is required. The takeoff data provided to the pilot has no method of adjustment for this; therefore, new performance numbers must be calculated.

**Full/Reduced Thrust Take-Off**

This section is a runway analysis concept. If conditions vary from that in the planned data section, proceed to this section. There are two possible types of data sections: *Full Thrust* and *Reduced Thrust*.



Title bar. Describes the configuration for which the data is calculated. You may have a choice of several blocks of data, each with unique conditions. If you can't find a title bar that matches your conditions, a new calculation is required.

--- REDUCED - DRY - OPT FLAPS - D-TO - A/C ON - A/I OFF ---										
RWY 05 3250 M					RWY 15 3666 M					
D-TO					TW01					
AT N1					FLAPS 5					
+50 97.0		157379		044-47-53		+56 95.7		155143		C48-54-59
+48 97.4		159656		045-48-54		+54 96.1		158000		C49-55-60
/+46 97.8		161933		046-49-55		/+52 96.5		162000		C51-57-62

Planned runway and intersection including Takeoff Run Available (TORA)

HW Headwind (or TW Tailwind) component in knots and planned Flaps configuration.

The "/" symbol is used to indicate the temperature for the Planned Takeoff Weight (PTOW). If conditions change, make sure that the PTOW is equal or lower than the Maximum Takeoff Weight (MTOW) after applying the respective corrections.

Maximum Runway Takeoff Weight (MRTW) and limit code. This number incorporates all limits for takeoff, i.e. accelerate stop/go obstacle, climb gradient, tires, etc. Consequently, there is no separate "climb limit" column.

V-speeds for Maximum Takeoff Weight (V1-VR-V2). Add 100 kts for three-digit speeds. V-speeds are based on Limiting Weight shown in the column to the left.

----- REDUCED - DRY - OPT FLAPS - D-TO - A/C ON - A/I OFF -----										
RWY 05 3250 M					RWY 15 3666 M					
D-TO					TW01					
AT N1					FLAPS 5					
+50 97.0		157379		C44-47-53		+56 -----		158000		C49-55-60
+48 97.4		159656		C45-48-54		+54 96.1		158000		C53-59-64
/+46 97.8		161933		F46-49-55		/+52 96.5		162000		C51-57-62
+44 98.3		164210		F47-50-56		+50 97.0		166000		C53-59-64
+42 98.7		166487		F47-51-57		+48 97.4		170000		C55-60-66
HW/10 KT +820					0					
TW/15 KT -18771					-3441					

Planned Takeoff Thrust setting

AT Assumed Temperature (or OAT Outside Air Temperature) in degrees Celsius.

If dashes (---) appear for a given temperature, takeoff is not permitted. Temperatures are listed in descending order.

Weight correction for indicated HW (Headwind) and TW (Tailwind) component.

Calculated N1/EPR values for given OAT or AT.

Note: V-speeds are based on Maximum Takeoff Weight (MTOW). As long as your Actual Takeoff Weight (ATOW) is lower, you can safely use these speeds even if they are higher than the required speeds for this weight.



## Special Engine Failure Take-Off Procedures (EOSID)

----- SPECIAL ENG FAIL TAKEOFF PROCEDURES -----	
RWY	LENGTH
05	3250M LT TO 'LBE' 115.1 (054 INBD,RT)
15	3666M AT 3.5 DME 'ALF' 115.8 LT TO 'HAM' 113.1 (009 INBD,RT)
23	3250M RT TO 'HAM' 113.1 (009 INBD,RT)
33	3666M CLIMB STRAIGHT AHEAD TO GT LCTR (323.0). WHEN PASSING 2000' TURN RIGHT TO HAM VORDME (113.10) CLIMBING TO 3000' AND HOLD (INBD 009, RT)

Most airports will have an engine failure procedure. This procedure has to be followed in case of an engine failure at Take-Off.

The Special Departure Procedure guarantee clearing all obstacles by at least 35 feet if an engine fails and V2 is maintained to the appropriate altitude. The primary function of Special Departure Procedures is to address the most critical time of an engine failure, i.e. shortly after liftoff below 1500' AAE.

Special Departure Procedures are meant to supplement professional knowledge, good judgment, and common sense; not to replace them. It is not possible to construct exact procedures for every conceivable engine out operation. Therefore, in any emergency situation, use the PIC emergency authority and total professional knowledge base to arrive at a solution with the highest probability of a successful outcome.

If, in fact, an engine has failed in VMC conditions, continuing the special departure procedure track until at least reaching minimum vectoring altitude would be prudent. However, the aircraft may depart from the special departure procedure and maneuver into a VFR pattern providing terrain clearance is assured.

### Planned Data (Landing)

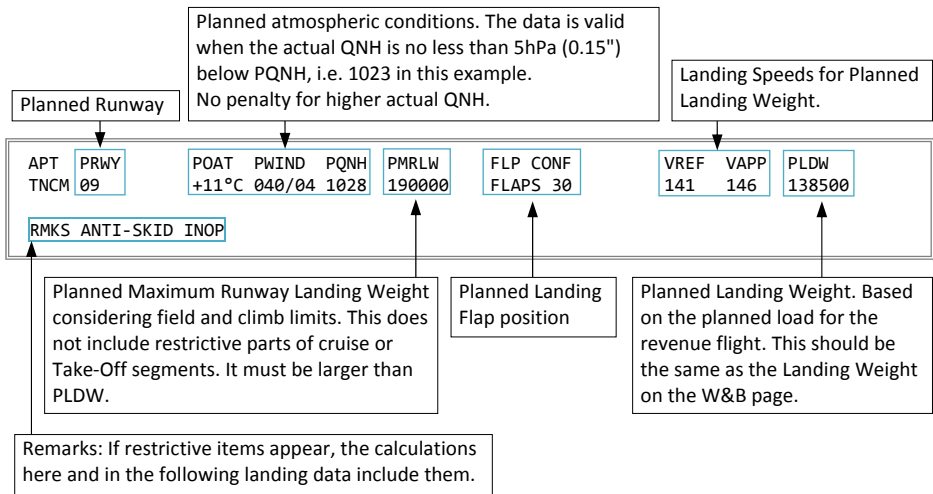
If actual conditions are the same as *Planned Data*, then no more calculations are necessary. However, this rarely occurs. If not, then proceed to the blocks of data below the *Planned Data* that correspond to the actual runway, configuration, and atmospheric conditions.

The Landing Report consists of a Dispatch Limits, Required Landing Distance and a Autobrake Landing Distance section. Use these data to determine your Maximum



Landing Weight, legally Required Landing Distance and actual distances using Autobrakes.

The report allows catering for different runways and conditions, low visibility and variations in landing weights.



### Dispatch Landing Limits

The Dispatch Landing Limit section consists of a data block for every runway at your destination. Data are available for Normal Visibility (manual landing, left column) and Low Visibility (autoland, right column). These tables can be used to determine the maximum landing weight allowed for flight dispatch based on available landing distance at the destination.

They are normally used by dispatch only for the planning phase of the flight. These data are based on touchdown at 1,000 ft (300 m) from the approach end of the runway at VREF with heavy braking (reverse thrust is not considered), allowing the airplane to land and stop within 60% (Jet) or 70% (Prop) of the effective length of the runway. Adjustments, e.g. anti-skid off, as indicated in the Remarks section, are included.



Maximum Runway Landing Weight (MRLW) and limit code. This number incorporates field and climb limits for landing. The left column shows limiting weights for normal visibility (manual landing), the right column for low visibility (autoland).

Planned Landing Runway and Landing Distance Available (LDA).

Planned Landing Flap position

OAT (Outside Air Temperature) in degrees Celsius.

If dashes (---) appear for a given temperature, landing is not permitted. Temperatures are listed in descending order.

---- DISPATCH LIMITS - DRY - A/C PACKS ON - A/I OFF ----

\*\*\* NORM VIS / LOW VIS \*\*\*

RWY 09 2180 M	HW02	RWY 10 2150 M	HW02
OAT   FLAPS 30		FLAPS 30	
+15 175570F/158477F		-----/-----	
+13 175570F/158477F		174293F/156885F	
/ +11 175570F/158477F /		174293F/156885F	
+9 175570F/158477F		174293F/156885F	
+7 175570F/158477F		174293F/156885F	
HW/10 KT +3564/ +5166		+3555/ +5023	
TW/15 KT -28357/ -36259		-29682/ -36931	

Weight correction for indicated HW (Headwind) and TW (Tailwind) component.

HW Headwind (or TW Tailwind) component in knots.

The “/” symbol is used to indicate the temperature for the Planned Landing Weight (PLDW). If conditions change, make sure that the PLDW is equal or lower than the Maximum Landing Weight (MLDW) after applying the respective corrections.

### Required Landing Distance

---- REQUIRED LDG DIST - NORM VIS - FLAPS 30 - A/C PACKS ON - A/I OFF ----

\*\*\* VALID FOR ALL RWYS AT TNCM. BASED ON NO WIND \*\*\*

LDW	DRY	WET	CONTAMIN.
142600	1726M	1985M	1985M
141200	1712M	1969M	1969M
139800	1697M	1952M	1952M
/138500 /	1684M /	1936M /	1936M /
137000	1668M	1919M	1919M
135600	1654M	1902M	1902M
134200	1639M	1885M	1885M
HW/10 KT	-95M	-110M	-110M
TW/15 KT	+404M	+464M	+464M

Landing Distances are provided for all levels of contamination available in the performance file.

Required Landing Distances are valid for all runways available in the report. Distances include the 60% (Jet) or 70% (Prop) factor.

Landing Distance correction for indicated HW (Headwind) and TW (Tailwind) component.

Data are provided for the Planned Landing Weight (indicated by “/”) with a range of higher/lower weights to cover operational weight variations.

This section can be used to quickly determine the Required Landing Distance (RLD) at a given airport. Calculations are based on the highest elevation and lowest slope



runway. So these data are conservatively valid for all runways contained in the report. Distances allow the airplane to land and stop within 60% (Jet) or 70% (Prop) of the effective length of the runway. Before landing, make sure that the Landing Distance Available (LDA) of your landing runway is greater than the Landing Distance Required (LDR).

TOPCAT performance allows an actual QNH variation of 5hPa (0.15" Hg) lower than planned QNH without requiring a recalculation. No penalty for higher QNH.

Data are available for Normal Visibility (manual landing) and Low Visibility (autoland). The Landing Distance Required (LDR) for the Planned Landing Weight (PLDW) is marked with a "/". Distances covering variations in Actual Landing Weight are given above and below.

### Autobrake Landing Distance

Landing Distances are provided for all Autobrake options available in the performance file.

Autobrake Landing Distances are valid for all runways contained in the report. Shown values are actual distances (without margin).

----- AUTOBRAKE LDG DIST - DRY - FLAPS 30 - A/C PACKS ON - A/I OFF -----					
*** VALID FOR ALL RWYS AT TNCM. BASED ON NO WIND ***					
LDW	AUTO 1	AUTO 2	AUTO 3	AUTO 4	AUTO MAX
141200	2714M	2222M	1911M	1599M	1288M
139800	2687M	2201M	1893M	1586M	1278M
/138500	/ 2667M	/ 2184M	/ 1880M	/ 1575M	/ 1270M
137000	2643M	2164M	1864M	1562M	1261M
135600	2620M	2146M	1849M	1550M	1252M
134200	2598M	2128M	1834M	1539M	1244M
HW/10 KT	0M	0M	0M	0M	0M
TW/15 KT	+526M	+434M	+366M	+297M	+206M

Data are provided for the Planned Landing Weight (indicated by "/") with a range of higher/lower weights to cover operational weight variations.

Autobrake Landing Distance correction for indicated HW (Headwind) and TW (Tailwind) component.

Use the Autobrake Landing Distance section to quickly determine the actual distance required for landing at a given airport. Data include 1,000 ft (300 m) air distance.

Calculations are based on the highest elevation and lowest slope runway. So these data are conservatively valid for all runways contained in the report.



TOPCAT performance allows an actual QNH variation of 5hPa (0.15" Hg) lower than planned QNH without requiring a recalculation. No penalty for higher QNH.

The Autobrake Landing Distance for the Planned Landing Weight (PLDW) is marked with a "/". Distances covering variations in Actual Landing Weight are given above and below.



# Sample Individual Runway Table (IRT)

```

*****
* EDDF 25R          * FLAPS 20    * TO1          * FRANKFURT MAIN *
*****
: ALL WEIGHTS IN KILOGRAMS (KG)                                NOT FOR OPERATIONAL USE :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: ELEVATION = 364 (FT) : B747-400/PW4062 : OBSTACLES DIST/HGT :
: SLOPE = -0.30 (%) : DATED 11 OCT 2008 08:34UTC :
: T.O.R.A. = 4000 (M) : : OBS(A) 5220 M/ 48FT :
: T.O.D.A. = 4000 (M) : AIR COND ON : OBS(B) 5450 M/ 63FT :
: A.S.D.A. = 4000 (M) : ANTI ICE OFF :
: LENGTH = 4000 (M) : RUNWAY COND DRY :
: WIDTH = 60 (M) : QNH = 1013.25 HPA :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: ENGINE OUT DEPARTURE (EOSID): :
: CLIMB STRAIGHT AHEAD TO 1900FT. TURN LEFT TO RID (D112.20) CLIMBING TO 4000FT :
: AND HOLD (246/R). :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: TEMP : WIND COMP : WIND COMP : WIND COMP : WIND COMP : WIND COMP :
: °C : -15 KTS : +0 KTS : +10 KTS : +20 KTS : +30 KTS :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: -20 : 400304 FIELD : 430000 BRAKES: 430000 BRAKES: 430000 BRAKES: 430000 BRAKES:
: : 144 172 180 : 150 172 180 : 151 172 180 : 151 172 180 : 152 172 180 :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: -10 : 394045 FIELD : 430000 BRAKES: 430000 BRAKES: 430000 BRAKES: 430000 BRAKES:
: : 143 170 180 : 150 172 180 : 151 172 180 : 151 172 180 : 152 172 180 :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: +0 : 389781 FIELD : 430000 BRAKES: 430000 BRAKES: 430000 BRAKES: 430000 BRAKES:
: : 142 169 179 : 150 172 180 : 151 172 180 : 151 172 180 : 152 172 180 :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: +10 : 382667 FIELD : 430000 BRAKES: 430000 BRAKES: 430000 BRAKES: 430000 BRAKES:
: : 140 168 178 : 150 172 180 : 151 172 180 : 151 172 180 : 152 172 180 :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: +20 : 375885 FIELD : 430000 BRAKES: 430000 BRAKES: 430000 BRAKES: 430000 BRAKES:
: : 138 166 177 : 150 172 180 : 151 172 180 : 151 172 180 : 152 172 180 :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: +40 : 348612 FIELD : 377747 CLIMB : 377747 CLIMB : 377747 CLIMB : 377747 CLIMB :
: : 132 160 170 : 148 169 177 : 149 169 177 : 149 169 177 : 150 169 177 :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: +50 : 321634 FIELD : 342312 CLIMB : 342312 CLIMB : 342312 CLIMB : 342312 CLIMB :
: : 129 155 163 : 143 161 169 : 144 161 169 : 144 161 169 : 145 161 169 :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: +65* : 282543 FIELD : 283343 CLIMB : 283343 CLIMB : 283343 CLIMB : 283343 CLIMB :
: : 109 129 144 : 109 129 145 : 109 129 145 : 109 129 145 : 109 129 145 :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: * = EXCEEDS RWY ENV TEMP LIMIT : RWY ENV TEMP LIMIT = +53°C :
: : : RWY ASS TEMP LIMIT = +74°C :
:--PRESSURE CORRECTION--:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: +10 HPA: +966 KG : +2760 KG : +2760 KG : +2760 KG : +2760 KG :
: -10 HPA: -6064 KG : -21503 KG : -22722 KG : -22722 KG : -22722 KG :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
: MAX BRAKE RELEASE WEIGHT MUST NOT EXCEED MAX CERT TAKEOFF WEIGHT OF 397005 KG :
:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:

```



*Intentionally left blank*



Impressum

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