USER MANUAL

LANDING DISTANCE CALCULATOR

GENERAL

INPUT

OUTPUT

GENERAL

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INPUT

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- Brakes deactivated

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Introduction

Welcome to the Landing Distance Calculator.

It has been developed to facilitate pilots to calculate normal and non normal landing distances and much much more.

This version includes all KLM Boeing aircraft and the British Airways 777 fleet.

You may use this app completely free of charge.

Thanks to a co-operation with Wings of Support you may, if you wish, make an in app donation to charity.

It would be appreciated if you could review this app in the Apple App Store.

I hope you will enjoy using this app.

Happy landings!

Roland Peeters (Captain 777)

For comments or suggestions please send me an e-mail. Disclaimer

General overview

The Landing Distance Calculator calculates landing distances and brake cooling advice for various aircraft types. It also has an integrated wind calculator and several other features.

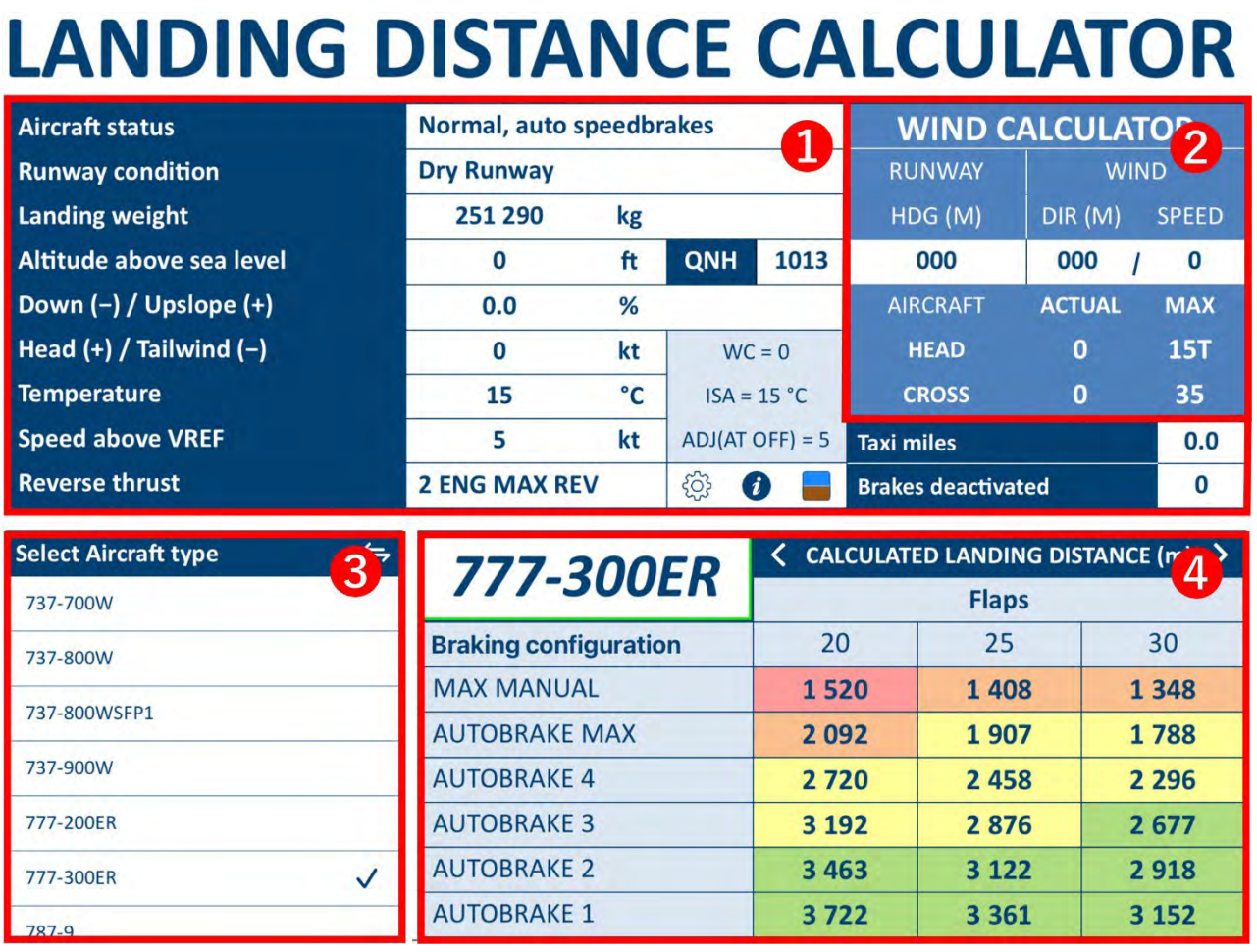
The app consists of 5 screens:

- The main screen: displays all input and output, except Flight with Unreliable airspeed.
- The Flight with Unreliable Airspeed screen.
- The settings screen: is used to select units and filter aircraft types.
- The user manual screen: displays the user manual.
- The donation screen: enables the user to make a donation to charity.

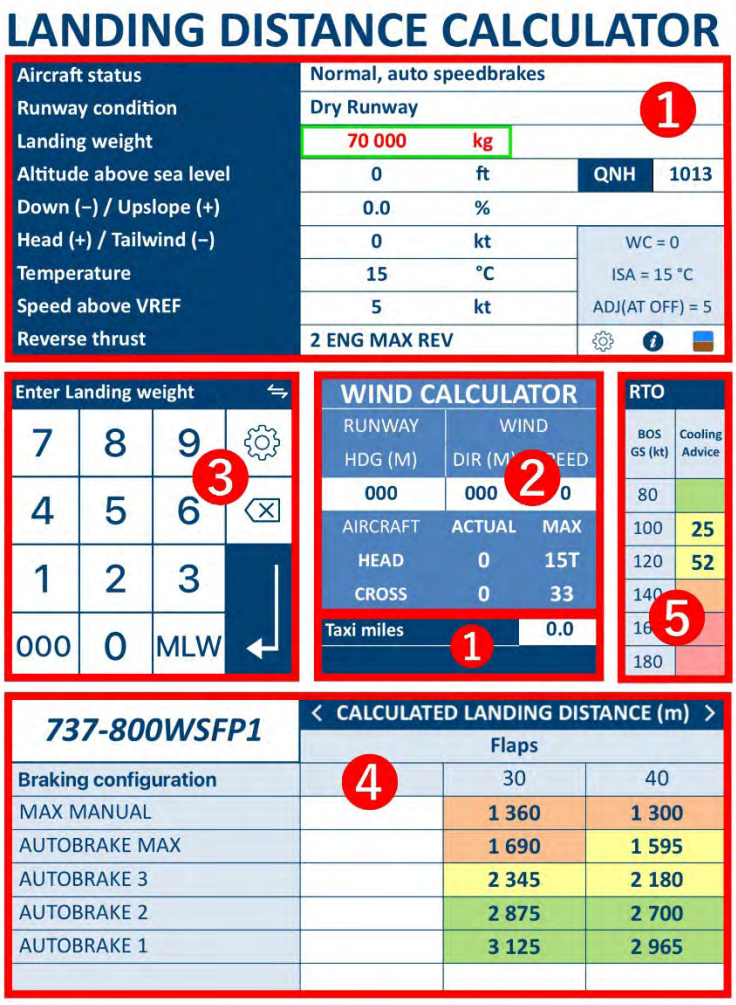
The main screen consists of:

- An input data display box ❶
- A wind calculator box ❷
- A data entry and selection pad / notes pad ❸
- A main output box ❹
- An info box (only available in Portrait mode) ❺

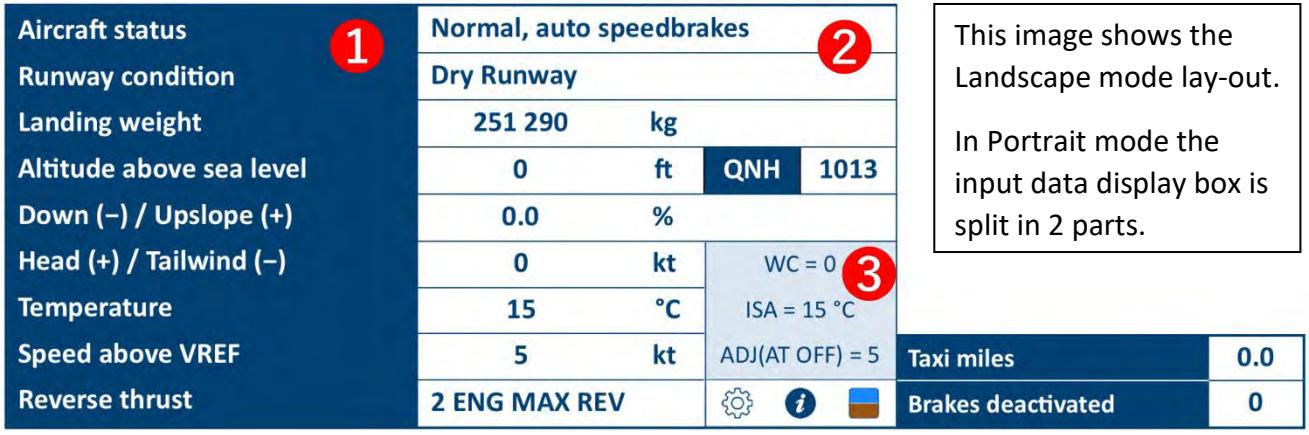
Main screen lay-out (Landscape mode)



Main screen lay-out (Portrait mode)



Input data display box lay-out



This image shows the Landscape mode lay-out.

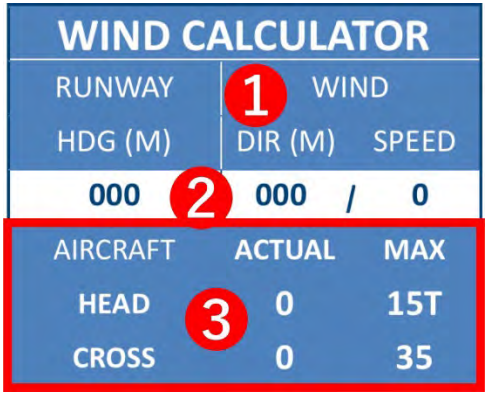
In Portrait mode the input data display box is split in 2 parts.

1. The dark blue areas contain the description of the data.
2. The white areas contain the data selection and entry fields.
3. The light blue box contains calculated data (WC, ISA and ADJ(AT OFF)).

The **active** data entry or field is marked by a **green box** around the field.

After tapping the enter key (arrow) at the Brakes deactivated entry field (or Taxi miles entry field when not available) the green box is NOT shown.

Wind calculator box lay-out



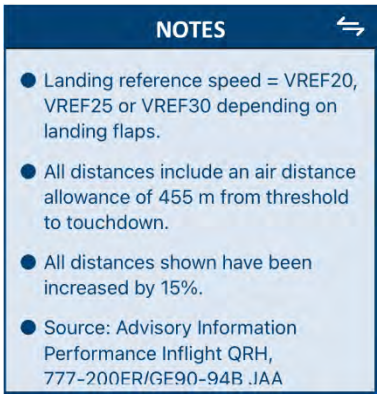
❶ The top blue area contain the description of the data to be entered.

❷ The white area contain the data entry fields (Runway heading, Wind direction and wind speed).

❸ The lower blue area contains calculated data:

- Head- and tailwind speed and direction (HEAD or TAIL)
- Crosswind speed and direction (L or R)
- Maximum tailwind
- Maximum crosswind

The 3 data entry and selection pad / notes pad views

SELECTION VIEW	ENTRY VIEW	NOTES VIEW
		
Displays a list of valid entries for the active selection field. The top blue bar prompts the necessary action, e.g. : “Select Aircraft type”. After tapping a selection the next data field activates automatically.	Displays a keyboard to enable entry of numerical values, a setting key, a backspace and enter key. Also some special keys will be shown depending on the. After tapping the enter key the next data field activates automatically.	Displays: • Landing reference speed • Notes in the QRH • Exceedance of MLW • Exceedance of TSLLW (787 only) • Source information

SELECTION VIEW	ENTRY VIEW	NOTES VIEW
Pops up at these data fields: • Aircraft type • Aircraft status • Runway condition • Reverse thrust	Pops up at these data fields: • Landing weight • Altitude above sea level and QNH • Down-/Upslope • Head-/Tailwind • Temperature • Speed above VREF • Runway heading • Wind direction • Wind speed • Taxi miles • (Brakes deactivated)	Pops up automatically: after tapping the enter key (arrow) at the Brakes deactivated entry field (or when not available Taxi miles field). It indicates completion of a full data entry cycle according the pre-set sequence. Shown manually: after tapping the exchange symbol in Selection view or Entry view.

Main output box views

CALCULATED LANDING DISTANCE VIEW	BRAKE COOLING ADVICE VIEW
777-300ER — CALCULATED LANDING DISTANCE (m)	**777-300ER** — BRAKE COOLING ADVICE

777-300ER — CALCULATED LANDING DISTANCE (m)

Braking configuration	Flaps 20	Flaps 25	Flaps 30
MAX MANUAL	1 520	1 408	1 348
AUTOBRAKE MAX	2 092	1 907	1 788
AUTOBRAKE 4	2 720	2 458	2 296
AUTOBRAKE 3	3 192	2 876	2 677
AUTOBRAKE 2	3 463	3 122	2 918
AUTOBRAKE 1	3 722	3 361	3 152

777-300ER — BRAKE COOLING ADVICE

Braking configuration	Flaps 20	Flaps 25	Flaps 30
MAX MANUAL	MELT ZONE	CAUTION	CAUTION
AUTOBRAKE MAX	CAUTION	71 min	63 min
AUTOBRAKE 4	56 min	44 min	35 min
AUTOBRAKE 3	27 min	12 min	NO PROC
AUTOBRAKE 2	NO PROC	NO PROC	NO PROC
AUTOBRAKE 1	NO PROC	NO PROC	NO PROC

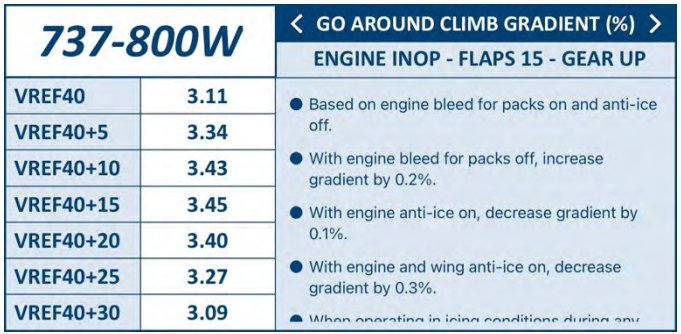
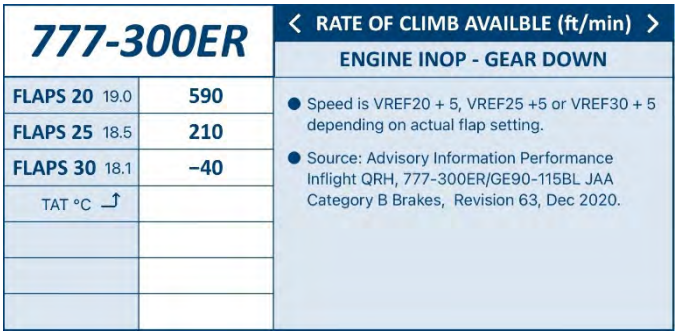
Displays:

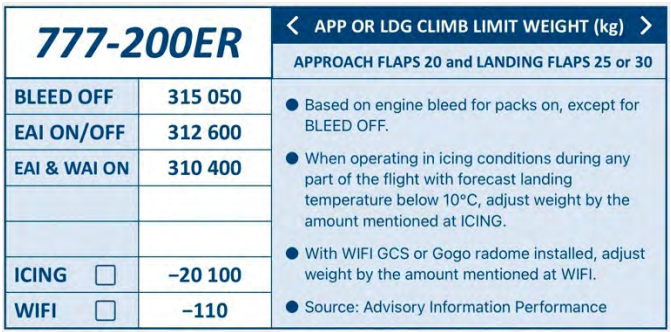
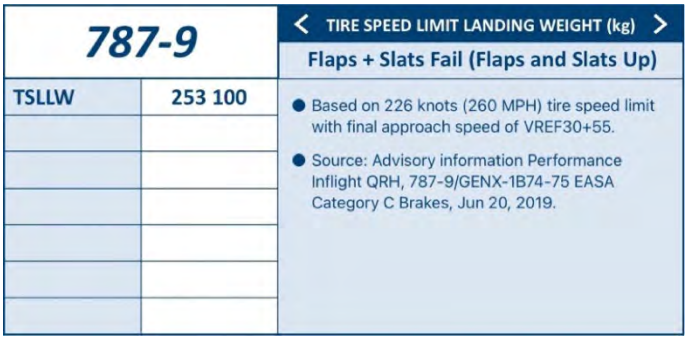
- Selected aircraft type
- Available braking configurations
- Available flap configurations
- Calculated landing distances
- Brake cooling advice (colour only)

This is the default view.

Displays:

- Selected aircraft type
- Available braking configurations
- Available flap configurations
- Brake cooling advice (colour and text)

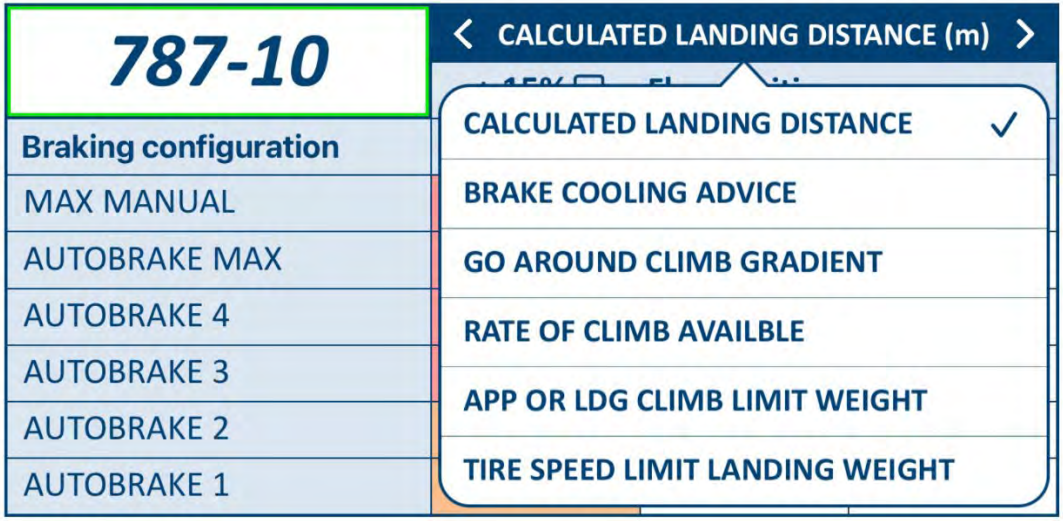
GO AROUND CLIMB GRADIENT VIEW	GEAR DOWN RATE of CLIMB AVAILABLE VIEW
	
Displays: • Selected aircraft type • Reference speed table • Go around climb gradients in % • Notes as listed in the QRH	Displays: • Selected aircraft type • Flap settings table • Gear down rate of climb available in ft/min • Notes as listed in the QRH • Derived TAT (Total Air Temperature)

APP OR LDG CLIMB LIMIT WEIGHT VIEW	TIRE SPEED LIMIT LANDING WEIGHT VIEW
	
Displays: • Selected aircraft type • Anti-ice options and corrections • Landing Climb Limit Weights • Notes as listed in the QRH Notes are formatted to match the output format, so there is some textual difference. When different landing flap settings are available these are selectable via an additional exchange symbol. 737: View title is LANDING CLIMB LIMIT WEIGHT.	Displays: • Selected aircraft type • Tire Speed Limit Landing Weight • Notes as listed in the QRH • Exceedance of TSLLW

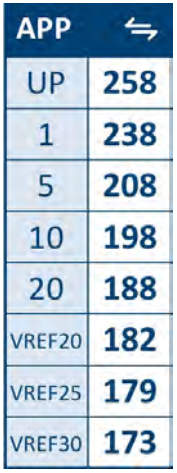
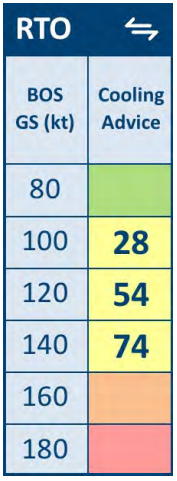
Navigating between the main output box views

To navigate between the main output box views use

- the forward/backward arrow keys
- the main output box views selector menu. To access this menu tap on the middle section above the main output box title.



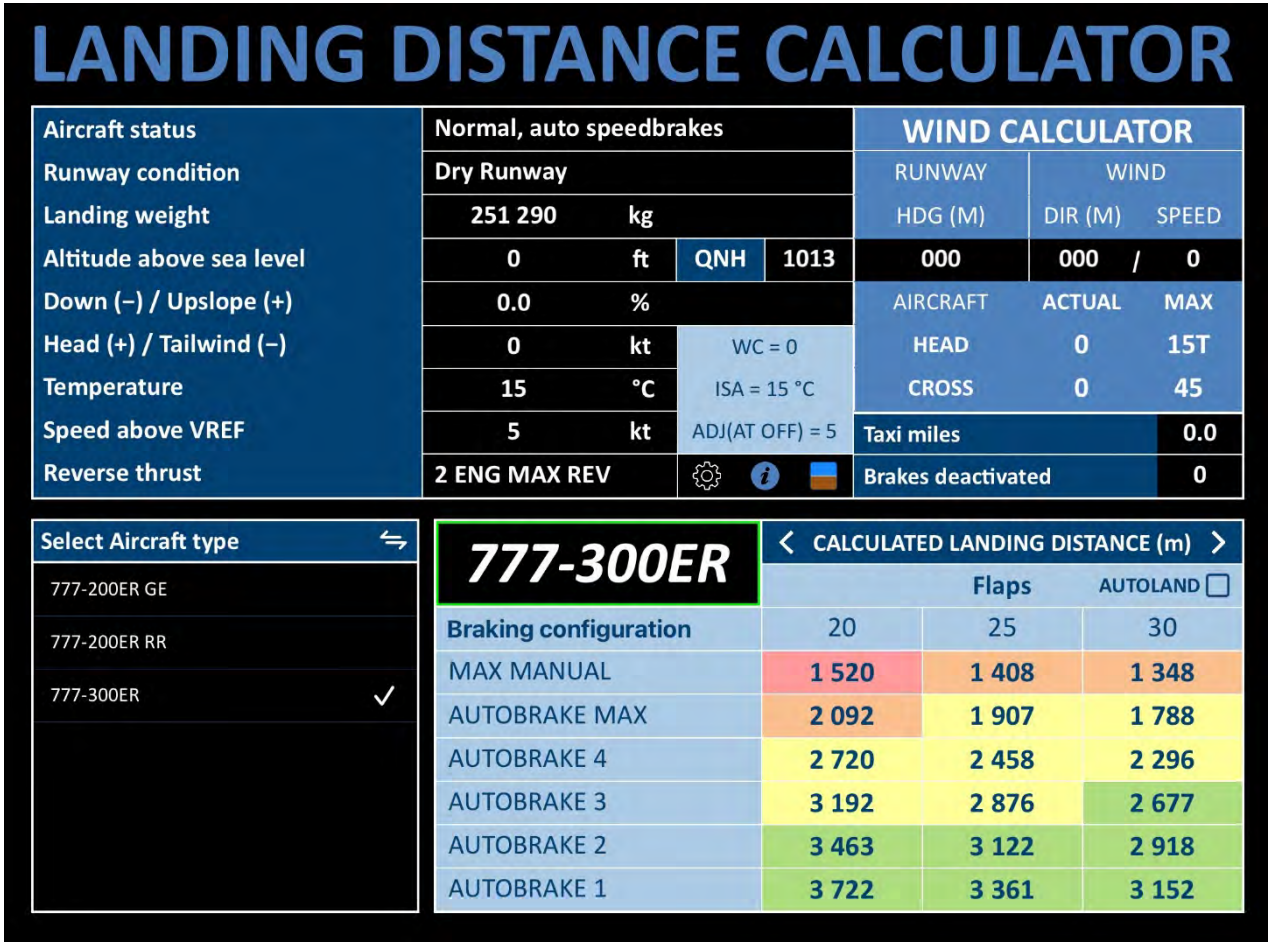
Info box views (only available in portrait mode)

MANEUVRING SPEEDS VIEW	RTO BRAKE COOLING VIEW
	
Displays: • Maneuver speeds • VREF speeds This is the default view.	Displays: • RTO (Rejected Takeoff) brake cooling advice.

Flight with Unreliable Airspeed view

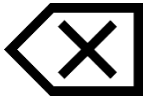
737-800W	FLIGHT WITH UNRELIABLE AIRSPEED ⇆							
	AIRCRAFT WEIGHT = 65 000 kg							
PHASE	ALTITUDE	FLAPS	GEAR	PITCH	%N1	KIAS		V/S
CRUISE	15 000	UP	UP	**2.5**	**72.2**	280		0
DESCENT	40 000	UP	UP	**0.8**	**IDLE**	.76M		−2 400
DESCENT	30 000	UP	UP	**−0.2**	**IDLE**	280		−2 200
DESCENT	20 000	UP	UP	**−0.5**	**IDLE**	280		−1 950
DESCENT	10 000	UP	UP	**−0.5**	**IDLE**	280		−1 750
DESCENT	0	UP	UP	**−0.8**	**IDLE**	280		−1 600
APPROACH	5 000	UP	UP	**5.8**	**59.6**	210	VREF40+70	0
APPROACH	5 000	1	UP	**5.8**	**62.1**	190	VREF40+50	0
APPROACH	5 000	5	UP	**6.2**	**62.6**	170	VREF40+30	0
APPROACH	5 000	15	DOWN	**6.0**	**72.1**	160	VREF40+20	0
FINAL	1 500	15	DOWN	**2.5**	**53.6**	165	VREF15+10	3° GS
FINAL	1 500	30	DOWN	**1.0**	**58.6**	158	VREF30+10	3° GS
FINAL	1 500	40	DOWN	**0.0**	**64.4**	150	VREF40+10	3° GS
GO AROUND	10 000	15	UP	**12.5**	**G/A**	160		2 150
GO AROUND	5 000	15	UP	**14.0**	**G/A**	160		2 450
GO AROUND	0	15	UP	**15.5**	**G/A**	160		2 750

Dark mode


LANDING DISTANCE CALCULATOR
Aircraft status
Normal, auto speedbrakes
Runway condition
Dry Runway
Landing weight
251 290
kg
Altitude above sea level
0
ft
QNH
1013
Down (−) / Upslope (+)
0.0
%
Head (+) / Tailwind (−)
0
kt
WC = 0
Temperature
15
°C
ISA = 15 °C
Speed above VREF
5
kt
ADJ(AT OFF) = 5
Reverse thrust
2 ENG MAX REV
WIND CALCULATOR
RUNWAY HDG (M)
WIND DIR (M) / SPEED
000
000 / 0
AIRCRAFT
ACTUAL
MAX
HEAD
0
15T
CROSS
0
45
Taxi miles
0.0
Brakes deactivated
0
Select Aircraft type
777-200ER GE
777-200ER RR
777-300ER
777-300ER
CALCULATED LANDING DISTANCE (m)
Flaps
AUTOLAND
Braking configuration
20
25
30
MAX MANUAL
1 520
1 408
1 348
AUTOBRAKE MAX
2 092
1 907
1 788
AUTOBRAKE 4
2 720
2 458
2 296
AUTOBRAKE 3
3 192
2 876
2 677
AUTOBRAKE 2
3 463
3 122
2 918
AUTOBRAKE 1
3 722
3 361
3 152

Legend

Below is a legend of several symbols that you will see in the app.

	Exchange: • Changes data entry and selection pad to Notes pad and vice versa. • Returns to the main screen from the Flight with Unreliable Airspeed screen or from the settings screen. • Returns from user manual screen to settings screen.
	Backward / forward scroll: • Scrolls the main output box views backward and forward.
	Backspace: • Deletes the last digit in the active data field. • If double clicked the active data field resets to zero. • If held for 3 seconds resets all input to default except Aircraft type.
	Settings: • Displays the settings screen.

	Enter: • Changes the active data field to the next field according a predetermined entry sequence. (Upon typing data or selecting data calculation is instantaneous, so in fact this button only moves to the next area.)
	Flight with Unreliable Airspeed: • Changes the active view to the Flight with Unreliable Airspeed view.

Input overview

All input on the main screen is done through the data entry and selection pad in the left lower corner. Through this pad entries and selections can be made.

The visual lay-out of the pad is configured automatically depending on the type of data that needs to be entered or selected.

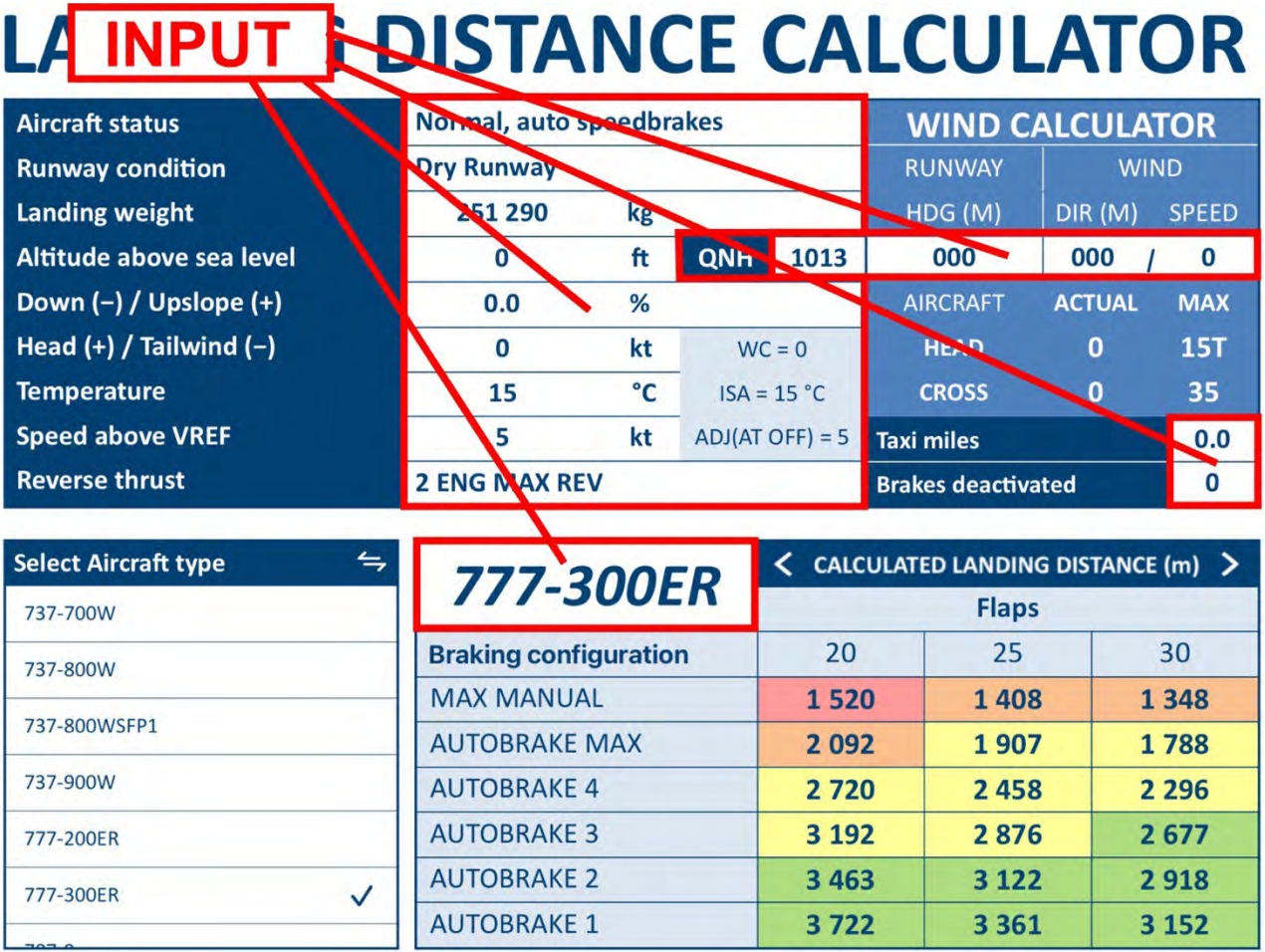
The top blue bar of the pad shows the action to be taken, e.g. “Select Aircraft type” or “Enter Landing weight”.

The area in which data can be entered or selected is marked by a green box.

Data entry and selection is done in a predetermined sequence. That means that after making a selection or tapping the arrow key the green box moves automatically to the next entry or selection field. This is done to speed up the entry process, however you may also select any field manually and enter or select data in any desired sequence. For this purpose tap the desired field, the green box will move to that field after which the pad configures automatically.

Upon start-up of the app the active field is the Aircraft type selection box.

Data input fields overview



Pre-set data entry and selection sequence

LANDING DISTANCE CALCULATOR

Aircraft status	Normal, au		eedbrakes	
Runway condition	Dry Runway			
Landing weight	251 290	kg		
Altitude above sea level	0	ft	QNH 1013	
Down (−) / Upslope (+)	0.0	%		
Head (+) / Tailwind (−)	0	kt	WC = 0	
Temperature	15	°C	ISA = 15 °C	
Speed above VREF	5	kt	ADJ(AT OFF) = 5	
Reverse thrust	2 ENG MAX REV			

WIND CALCULATOR

RUNWAY	WIND	
HDG (M)	DIR (M)	SPEED
000	000 /	0

AIRCRAFT	ACTUAL	MAX
HEAD	0	15T
CROSS	0	35

Taxi miles	0.0
Brakes deactivated	0

Select Aircraft type
737-700W
737-800W
737-800WSFP1
737-900W
777-200ER
777-300ER ✓

777-300ER

CALCULATED LANDING DISTANCE (m)

Braking configuration	Flaps 20	Flaps 25	Flaps 30
MAX MANUAL	1 520	1 408	1 348
AUTOBRAKE MAX	2 092	1 907	1 788
AUTOBRAKE 4	2 720	2 458	2 296
AUTOBRAKE 3	3 192	2 876	2 677
AUTOBRAKE 2	3 463	3 122	2 918
AUTOBRAKE 1	3 722	3 361	3 152

Upon **start-up** of the app the aircraft type selection is shown
and these **default values** are loaded:

Aircraft type	B777-300ER or previously selected type
Aircraft status	Normal, auto speedbrakes
Runway condition	Dry Runway
Landing weight	MLW (Maximum Landing Weight)
Altitude above sea level	0
QNH	STD (1013 hPa or 29.92 inHg)
Down- / Upslope	0.0
Head- / Tailwind	0
Temperature	ISA (15 °C or 59 °F)
Speed above VREF	5
Reverse thrust	2 ENG MAX REV
Runway heading	000
Wind direction	000
Wind speed	0
Taxi miles	0.0
Brakes deactivated (if applicable)	0

When holding the backspace button for 3 seconds the default values are restored.

Invalid data

Invalid data means entries or results of which the value is either:

- exceeding an aircraft limitation, e.g. Runway slope 3.0 or Crosswind 50

– OR –

- not realistic, e.g. QNH 800 or Runway heading 400

The landing distance calculator will allow entry of invalid input and will warn you by the change of text colour into **RED** with a PINK background.

Invalid INPUT will disable OUTPUT.

Aircraft status	HYD PRESS SYS L+C				WIND CALCULATOR		
Runway condition	Medium Reported Braking Action				RUNWAY	WIND	
Landing weight	251 290	kg			HDG (M)	DIR (M)	SPEED
Altitude above sea level	0	ft	QNH	1013	002	310 /	12G35
Down (–) / Upslope (+)	2.5	%			AIRCRAFT	ACTUAL	MAX
Head (+) / Tailwind (–)	0	kt	WC = 22		HEAD	21.5	10T
Temperature	15	°C	ISA = 15 °C		CROSS L	27.6	20
Speed above VREF	5	kt	ADJ(AT OFF) = 15		Taxi miles		0.0
Reverse thrust	2 ENG MAX REV				Brakes deactivated		0

The table below shows the values outside which the calculator will regard the input as invalid.

Entry field	**Invalid below**	**Invalid above**
Landing weight	Minimum Inflight Weight	Maximum Takeoff Weight
Altitude above sea level	-1 240	Maximum Landing Altitude
QNH	950 hPa / 28.00 inHg	1050 hPa / 31.00 inHg
Down- / Upslope	-2.0	+2.0
Head- / Tailwind	Maximum tailwind	65 kts (not a limitation)
Temperature	-54 °C	+54 °C
Speed above VREF	0 (Red color when below 5)	15
Runway heading		360
Wind direction		360

Wind speed with gust speed at or below mean wind speed is regarded as invalid.

The aircraft status selection will become invalid when the aircraft type is changed and the current aircraft status does not match that aircraft type.

The reverse thrust selection will become invalid when the aircraft status is changed to a status that does not allow the current reverse thrust selection, e.g. the combination of 2 ENG MAX REV and ENG SHUTDOWN L, R.

Aircraft type

When the Aircraft type selection is active the data entry pad will prompt “Select Aircraft type”.

All available aircraft types are listed in the selection box. The aircraft types available are determined by selections in the settings screen.

Aircraft type selection activates the next field: Aircraft condition selection.

Aircraft status

When the Aircraft status selection is active the data entry pad will prompt “Select Aircraft status”.

All normal and non normal aircraft statuses are listed in the selection box.

A check mark is visible behind the current aircraft status.

Aircraft status activates the Runway condition selection.

Runway condition

When the Runway condition selection is active the data entry pad will prompt “Select Runway condition”.

All runway conditions are listed in the selection box.

A check mark is visible behind the current runway condition.

Runway condition selection activates the Landing weight entry.

Landing weight

When the Landing weight entry is active the data entry pad will prompt “Enter Landing weight”.

Type the digits to form the landing weight.

The 000 key will paste 000 behind the digits entered provided not more than 3 digits were entered.

The MLW key will replace the existing value with the Maximum Landing Weight.

Landing weight entries above Maximum Landing weight will cause the value turn red; and output will still be displayed.

Landing weight entries below Minimum Inflight weight or above Maximum Takeoff weight will turn red with pink background; and output is disabled.

Tapping the enter key will activate the Altitude above sea level entry.

Altitude above sea level

When the Altitude above sea level entry is active the data entry pad will prompt “Enter Runway elevation”.

Type the digits to form the runway elevation.

The 000 key will paste 000 behind the digits entered provided not more than 2 digits were entered.

To enter an altitude below sea level the minus (–) key may be pressed before or after entering the digits.

Tapping the enter key will activate the QNH entry.

QNH

When the QNH entry is active the data entry pad will prompt “Enter QNH”.

Type the digits to form the QNH.

The STD key will replace the existing value with 1013 or 29.92 depending on the pressure setting in the settings screen.

Tapping the enter key will activate the Runway heading entry.

NOTE:

In this app QNH will affect all Landing Distances (Pressure altitude is accounted for)

<u>Regarding pressure altitude and landing distances Boeing has stated:</u>

QUOTE
… Advisory Normal and Non-Normal Landing Distances and adjustments are provided as an approximation of actual performance, and are based on average fairings of a large array of performance conditions. For small QNH corrections, no large error would be introduced if the table was entered with elevation instead of pressure altitude, so the labeling of the altitude adjustments was deliberately ambiguous ...

… Most other advisory performance tables in the FCOM pertain to takeoff data, where the ambient pressure change and effect on aircraft (engine) performance is more significant. In these cases, we made it a point to label the altitude adjustments for pressure altitude. The only other truly advisory landing performance table presents in the FCOM is the Recommended Brake Cooling Schedule (RBCS), which is highly dependent on the true airspeed, which in turn is highly dependent on pressure altitude. For that reason, the altitude column in the RBCS also references pressure altitude.
END QUOTE

In this app pressure altitude is used for calculations of landing distances (so QNH does have influence on the landing distances), in order to generate a more accurate result.
Brake cooling for landing also uses pressure altitude for calculations (so QNH does have influence on the result).
Brake cooling advise for take-off does <u>not</u> consider pressure altitude since Brakes ON <u>GROUNDSPEED</u> is used and the brake cooling table is entered with 15°C, sea level.

Runway heading

When the Runway heading entry is active the data entry pad will prompt “Enter Runway heading”.

Type the digits to form the magnetic runway heading.

Tapping the enter key will activate the Wind direction entry.

Wind direction

When the Wind direction entry is active the data entry pad will prompt “Enter Wind direction”.

Type the digits to form the magnetic wind direction.

The VRB (Variable) key will paste VRB as wind direction value. The logic then is that the wind direction is assumed be 180 degrees of the Runway heading at the previous entry. So VRB / 5 will be regarded as 5 knots tailwind.

Entry of variable wind between 2 wind directions is not supported.

Wind direction entries have NO effect on the calculated landing distances or brake cooling advice.

Tapping the enter key will activate the Wind speed entry.

Wind speed

When the Wind speed entry is active the data entry pad will prompt “Enter Wind speed”.

Type the digits to form the wind speed.

The G (Gust) key may be used to enter gusting wind. E.g. windspeed 15 knots gusting 25 knots can be entered as 15G25

Wind speed entries have NO effect on the calculated landing distances or brake cooling advice.

Tapping the enter key will activate the Down- / Upslope entry.

Down- / Upslope

When the Down- / Upslope entry is active the data entry pad will prompt “Enter Runway slope”.

Type the digits to form the slope.

To enter a negative slope the minus (–) key may be pressed before or after entering the digits.

Tapping the enter key will activate the Head- / Tailwind entry.

Head- / Tailwind

When the Head- / Tailwind entry is active the data entry pad will prompt “Enter Wind”.

Type the digits or use the WC key to form the wind.

The WC (Wind Component) key will paste the value in the light blue box mentioned after “WC =”. This is handy when correct values were entered in the wind calculator.

To enter a tailwind the minus (–) key may be pressed before or after entering the digits.

Tapping the enter key will activate the Temperature entry.

Temperature

When the Temperature entry is active the data entry pad will prompt “Enter Temperature”.

Type the digits to form the temperature.

The ISA (International Standard Atmosphere) key will paste the value in the light blue box mentioned after “ISA =”.

To enter a negative temperature the minus (–) key may be pressed before or after entering the digits.

Tapping the enter key will activate the Speed above VREF entry.

Note: Temperature is OAT. The Gear Down Landing Rate of Climb table assumes entry of TAT. This app takes OAT and calculates total Ram Rise to determine TAT. For more information refer to the description of TAT.

Speed above VREF

When the Speed above VREF entry is active the data entry pad will prompt “Enter Speed above VREF”.

Type the digits or use the ADJ (AT OFF) key to form the speed above VREF.

The ADJ (AT OFF) key will paste the value in the light blue box mentioned after “ADJ (AF OFF) =”. This is handy when correct values were entered in the wind calculator and a landing is made with autothrottle OFF. For landings with autothrottle ON Boeing prescribes a 5 knot adjustment.

When entering a value below 5 the input will be displayed in red color to indicate it is below the minimum, however the app will continue to calculate.

Tapping the enter key will activate the Reverse thrust selection.

Note:

Under these conditions the Speed above VREF entry is disabled:

- All aircraft types except 787: Aircraft status is Airspeed Unreliable
- 787: Aircraft status is Flaps + Slats Fail (Flaps and Slats Up)

Reverse thrust

When the Reverse thrust selection is active the data entry pad will prompt “Select Reverse thrust”.

All available reverse thrust options are listed in the selection box.

A check mark is visible behind the current reverse thrust option if available.

Reverse thrust selection will activate the Taxi miles entry.

Taxi miles

When the Taxi miles entry is active the data entry pad will prompt “Enter Taxi miles”.

Type the digits to form the amount of miles that is expected to be taxied after landing.

The Taxi miles entry only has effect on the brake cooling advice.

777/787: Tapping the enter key will activate the Brakes deactivated entry.

737: The Taxi miles entry is regarded as the completion of a full data entry cycle. Upon tapping the enter key the green box will not be visible anymore and the notes pad will replace the data entry pad.

Brakes deactivated

When the Brakes deactivated entry is active the data entry pad will prompt “Enter Brakes deactivated”.

Type 0, 1 or 2 depending on how many brakes are deactivated.

1 or 2 deactivated brakes have no effect on the landing distance. They will however increase the brake energy in the remaining brakes and will increase the amount of brake cooling needed.

The Brakes deactivated entry is regarded as the completion of a full data entry cycle. Upon tapping the enter key the green box will not be visible anymore and the notes pad will replace the data entry pad.

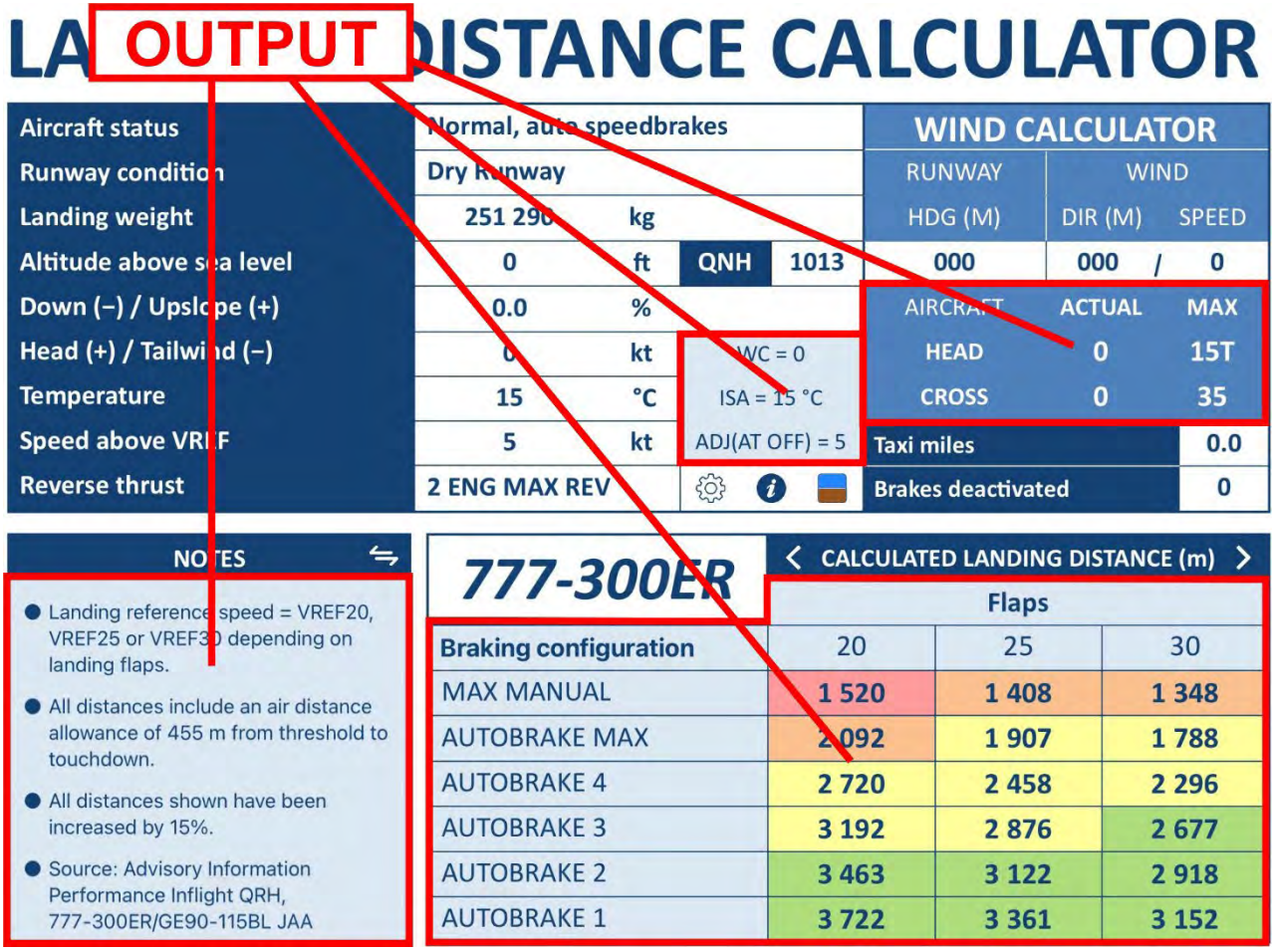
Output overview

All output is instantly calculated and is shown on 2 screens.

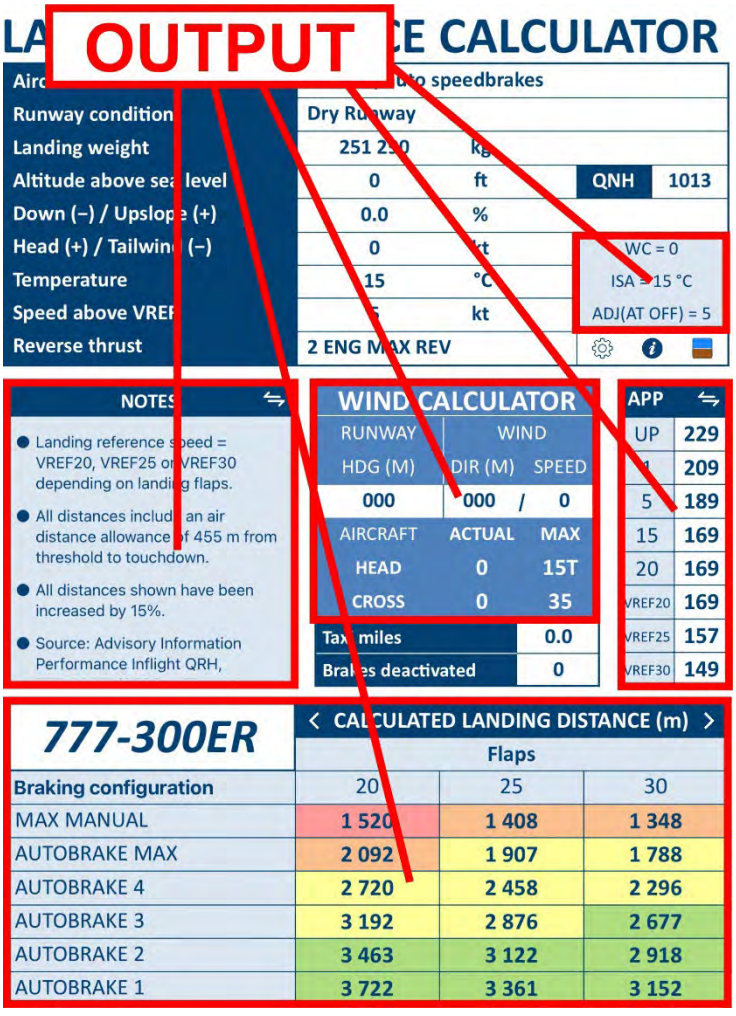
- The main screen
- The Flight with Unreliable Airspeed screen

Screen lay-outs are shown in the next pages.

Data output lay-out (Landscape mode)



Data output lay-out (Portrait mode)



Data output lay-out for Flight with unreliable airspeed

737-700W	OUTPUT	FLIGHT WITH UNRELIABLE AIRSPEED ⇋						
		AIRCRAFT WEIGHT = 52 000 kg						
PHASE	ALTITUDE	FLAPS	GEAR	PITCH	%N1	KIAS		V/S
CLIMB	40 000	UP	UP	4.1	MAX CLB	.76M		1 100
CLIMB	30 000	UP	UP	4.0	MAX CLB	280		1 900
CLIMB	20 000	UP	UP	6.4	MAX CLB	280		3 100
CLIMB	10 000	UP	UP	8.9	MAX CLB	280		4 050
CLIMB	0	UP	UP	12.2	MAX CLB	280		5 000
CRUISE	40 000	UP	UP	2.7	85.8	.76M		0
CRUISE	35 000	UP	UP	2.1	82.5	280		0
CRUISE	30 000	UP	UP	1.6	81.2	280		0
CRUISE	25 000	UP	UP	1.6	77.6	280		0
CRUISE	20 000	UP	UP	1.6	74.0	280		0
CRUISE	15 000	UP	UP	1.7	70.2	280		0
DESCENT	40 000	UP	UP	−0.3	IDLE	.76M		−2 450
DESCENT	30 000	UP	UP	−1.8	IDLE	280		−2 400
DESCENT	20 000	UP	UP	−1.8	IDLE	280		−2 200
DESCENT	10 000	UP	UP	−1.8	IDLE	280		−1 950
DESCENT	0	UP	UP	−1.8	IDLE	280		−1 750

Calculated Landing Distance

The calculated landing distance box contains:

1. Braking configuration.
2. Flap configuration.
3. Landing distances and brake cooling advice (colour)

777-300ER	CALCULATED LANDING DISTANCE (m) ⇆		
	Flaps (2)		
Braking configuration (1)	20	25	30
MAX MANUAL	1 520	1 408	1 348
AUTOBRAKE MAX	2 092	1 907	1 788 (3)
AUTOBRAKE 4	2 720	2 458	2 296
AUTOBRAKE 3	3 192	2 876	2 677
AUTOBRAKE 2	3 463	3 122	2 918
AUTOBRAKE 1	3 722	3 361	3 152

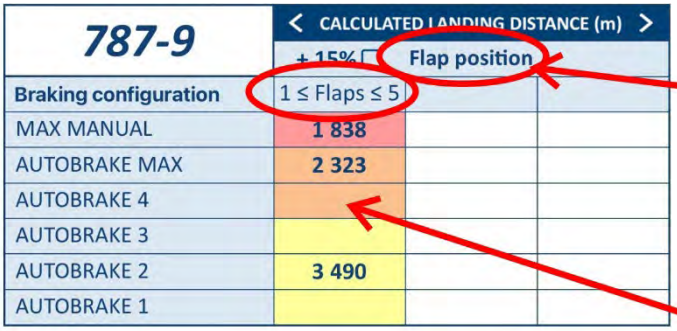
The calculated landing distance box may also show these check boxes:

❶ +15%: adds 15% to all displayed distances. (Non normal only)

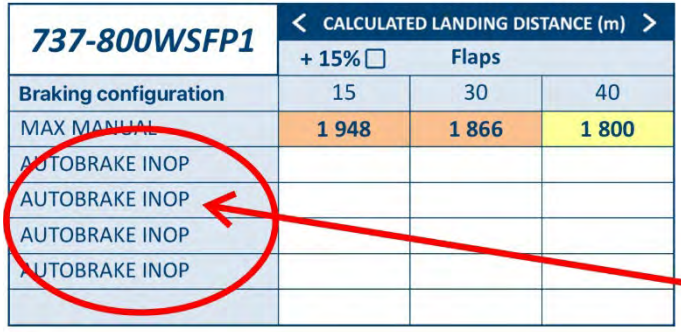
❷ AUTOLAND: adds 300 m to all displayed distances, except flaps 25 since that is not a certified Autoland flap setting. (British Airways only)

If both boxes are checked first 15% will be added and therafter 300 m.

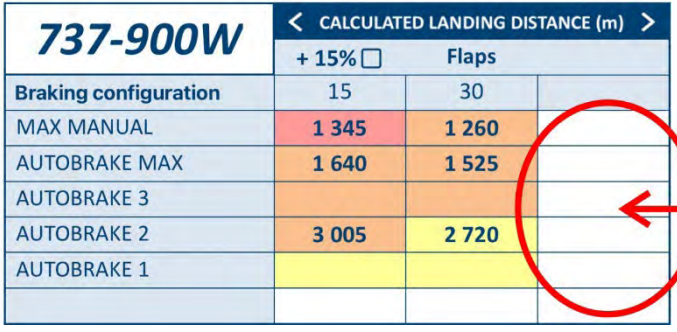
777-300ER	CALCULATED LANDING DISTANCE (m)		
	+ 15% ☐ 1	Flaps	AUTOLAND ☐ 2
Braking configuration		25	
MAX MANUAL		1 317	1 262
AUTOBRAKE MAX		1 656	1 552
AUTOBRAKE 4			
AUTOBRAKE 3			
AUTOBRAKE 2		2 871	2 653
AUTOBRAKE 1			



787-9	CALCULATED LANDING DISTANCE (m)		
	+ 15% ☐	Flap position	
Braking configuration	1 ≤ Flaps ≤ 5		
MAX MANUAL	1 838		
AUTOBRAKE MAX	2 323		
AUTOBRAKE 4			
AUTOBRAKE 3			
AUTOBRAKE 2	3 490		
AUTOBRAKE 1			



737-800WSFP1	CALCULATED LANDING DISTANCE (m)		
	+ 15% ☐	Flaps	
Braking configuration	15	30	40
MAX MANUAL	1 948	1 866	1 800
AUTOBRAKE INOP			
AUTOBRAKE INOP			
AUTOBRAKE INOP			
AUTOBRAKE INOP			



737-900W	CALCULATED LANDING DISTANCE (m)		
	+ 15% ☐	Flaps	
Braking configuration	15	30	
MAX MANUAL	1 345	1 260	
AUTOBRAKE MAX	1 640	1 525	
AUTOBRAKE 3			
AUTOBRAKE 2	3 005	2 720	
AUTOBRAKE 1			

Note that the text in these boxes has changed to reflect the exact wording in the QRH for FLAPS DRIVE:
Flap position and **(1≤Flaps≤5)**

A cell without a value means that no landing distance is available for this brake configuration. However a brake cooling advice is available.

For aircraft conditions where autobrakes are inoperative this will be shown as depicted.

Note that these cells are white because there is no other flap configuration available for this aircraft condition.

777-300ER	< CALCULATED LANDING DISTANCE (m) >		
	+ 15% ☐ Flaps		
Braking configuration	20		30
MAX MANUAL	**1 395**		**1 230**
AUTOBRAKE MAX	**1 860**		**1 595**
AUTOBRAKE 4			
AUTOBRAKE 3			
AUTOBRAKE 2	**3 230**		**2 695**
AUTOBRAKE 1			

30 will be shown in red colour for the following conditions:

- Aircraft type 777-200ER or 777-300ER – AND –
- Landing weight > Maximum landing weight

  – AND –
- Aircraft condition is ENG SHUTDOWN L, R – OR –
- VREF30 + 5 is above:
  - 160 kts (777-200ER)
  - 170 kts (777-300ER)

The QRH mentions VREF30 + additives (wind and gusts, 5 knots minimum)

For the above conditions the QRH may preclude the use of Flaps 30.

Brake cooling advice for landing

Brake cooling advice for landing is always shown by the background colour in each landing distance field. When the brake cooling advice view is selected the advice is also visible in text format. The advice is for ground cooling only.

The meaning of the colours is:

	MELT ZONE	**Fuse plug melt zone**
	CAUTION	**Caution zone**
10	10 min	**Brake cooling advice for 10 minutes**
	NO PROC	**No procedures**
		No brake cooling advice available

For the calculation of the brake cooling advice for landing the assumption is made that the Brakes ON Speed equals VREF for the applicable flap setting + the increment according QRH for the current Aircraft status + TWC (tailwind component) or – HWC (headwind component).

For example, 777-200ER with Aircraft status “SLATS DRIVE” brake cooling for a flaps 20 landing with 8 knots headwind component assumes a Brakes ON Speed of VREF30 + 30 – 8 kts.

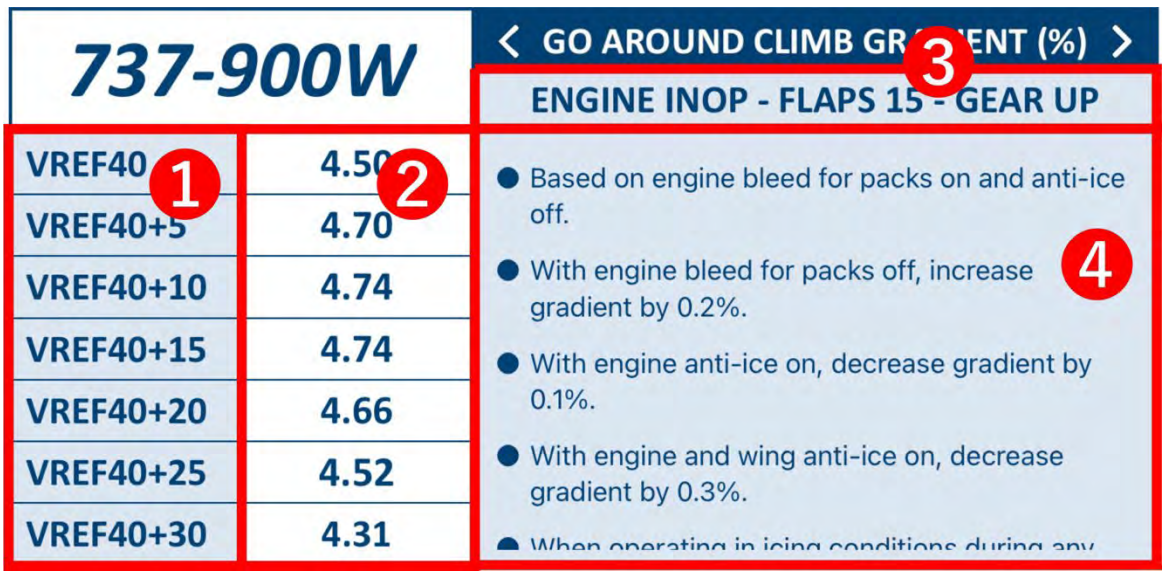
Speed above VREF additive is not accounted for in the determination of Brakes ON Speed. In many cases this reflects the actual situation where the additive is bled off to zero upon touchdown, but in other cases it might not.
E.g. On the 777 and 787 all steady wind additive is bled off upon touchdown, while on 737 only a part of the steady wind additive is bled off upon touchdown with a minimum of 5 knots. On all Boeing types gust additive are to kept until touchdown.

It also should be realized that brake cooling figures assume braking till standstill.

Go-around climb gradient

The go-around climb gradient box contains:

1. List of reference speeds and increments
2. Go-around climb gradient in %
3. Aircraft configuration
4. Notes (anti-ice corrections and source information)



Go-around climb gradients are available when
a valid landing weight is entered.

It is a dispatch requirement to meet a certain minimum go-around climb gradient.

Boeing states:

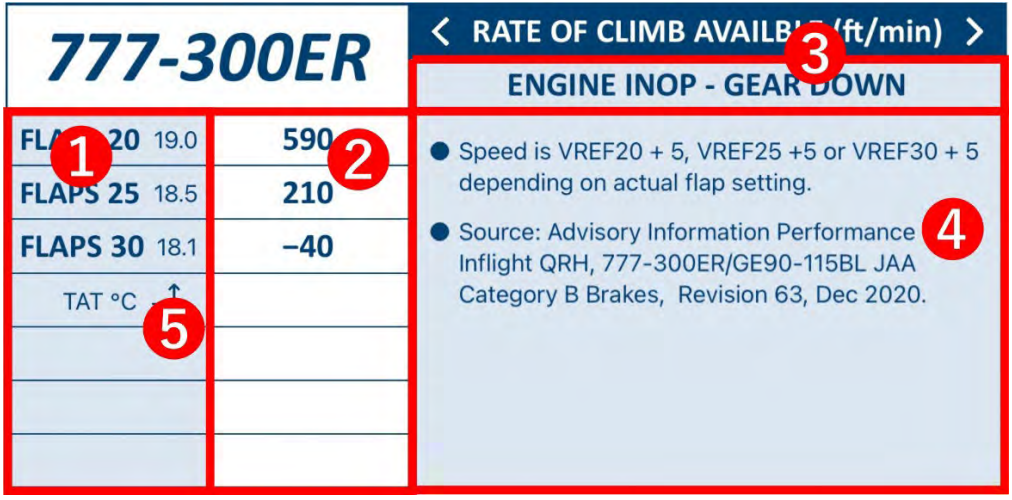
> *For instrument approaches, the expected landing weight must allow a missed approach climb gradient of at least 2.5% or the published gradient, whichever is the greater.*
>
> *For instrument approaches with a decision height above 200 ft a lower than 2.5% missed approach climb gradient may be published. The lowest limit will always be 2.1%, even if a lower than 2.1% minimum missed approach climb gradient is published.*
>
> *2.1% climb gradient is the minimum certified go-around climb gradient for a two-engine airplane.*

Inflight the information gives insight into actual aircraft performance margins.

Gear Down Landing Rate of Climb Available

The Gear Down Landing Rate of Climb Available box contains:

1. List of flap settings
2. Gear Down Landing Rate of Climb Available in ft/min
3. Aircraft configuration
4. Notes (including WIFI radome corrections and source information)
5. Derived TAT (Total Air Temperature)



Gear Down Landing Rate of Climb Available is available
when a valid landing weight is entered.

The values shown give insight in how much climb performance is available with flaps and gear in extended position during go-around.

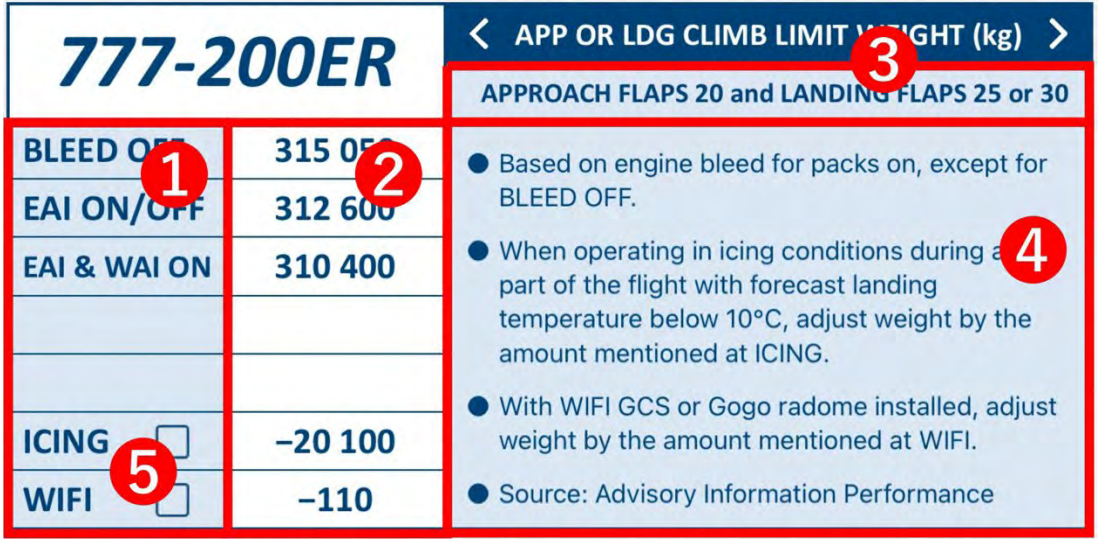
There is no legal requirement for Gear Down Landing Rate of Climb Available.

Note: The Boeing tables call for TAT (Total Air Temperature) while the entry in the main screen is just Temperature, which is OAT (Outside Air Temperature). The app will automatically adjust the OAT temperature entry, which means that it will add the ram rise for the applicable approach speed to the entered temperature for its calculations.

Approach or Landing Climb Limit Weight (LCLW)

The landing climb limit weight box contains:

1. List of bleed and anti-ice options and checkboxes 5
2. Landing climb limit weights and corrections
3. Aircraft configuration (if applicable: flap options are selectable via ⇋)
4. Notes (anti-ice and WIFI radome corrections and source information)



Landing climb limit weights are available when
a valid landing weight is entered.

It is a dispatch requirement to meet a certain landing climb performance.

The legal requirement is:

> *In the landing configuration (landing flaps and gear down), the steady gradient of climb may not be less than 3.2%, with the engines at the thrust that is available 8 seconds after initiation of movement of the thrust levers from minimum flight idle to the go-around thrust setting.*

The Landing Climb Limit Weight (LCLW) results show the weights at which these minimum requirements are met.

Inflight the information gives insight into actual aircraft performance margins.

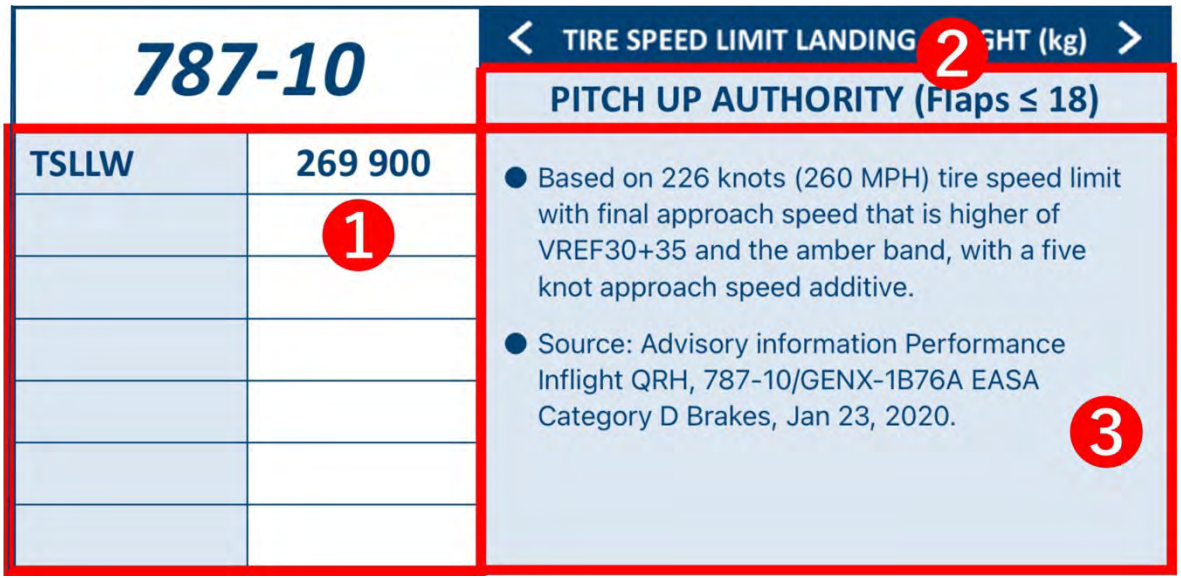
When checking the ICING and/or WIFI checkbox the LCLW weights will be automatically adjusted with the corrections. The boxes will be unchecked when closing the app.

737: QRH only mentions LANDING CLIMB LIMIT WEIGHT.

Tire Speed Limit Landing Weight (TSLLW)

The landing climb limit weight box contains:

1. Tire speed limit landing weight
2. Aircraft status
3. Notes and source information



Tire speed limit landing weights are available when these conditions are met:

- A valid landing weight is entered – AND –
- Aircraft type is 787-9 or 787-10 – AND –
- Aircraft status is:
  - Flaps + Slats Fail (Flaps and Slats Up) – OR –
  - FLAPS DRIVE (1 ≤ Flaps ≤ 5) – OR –
  - PITCH UP AUTHORITY (Flaps ≤ 18)

In the above cases the QRH will direct to check the TSSLW.

Flight with Unreliable Airspeed

The Flight with Unreliable Airspeed screen shows:

1. Aircraft weight (equals Landing weight on the main screen)

   737: default header message: AIRCRAFT ALTITUDE = S.L.

2. Pitch, thrust, speed and V/S information

3. A light green marker box (selectable at any line to improve readability)

737-800W	FLIGHT WITH UNRELIABLE AIRSPEED ⇋							
	AIRCRAFT WEIGHT = 63 500 kg 1							
PHASE	ALTITUDE	FLAPS	GEAR	PITCH	%N1	KIAS		V/S
CRUISE	15 000	UP	UP	2.4	72.1	280		0
DESCENT	40 000	UP	UP	0.7	IDLE	.76M		−2 350
DESCENT	30 000	UP	UP	−0.5	IDLE	280		−2 200
DESCENT	20 000	UP	UP	−0.6	IDLE	280		−1 950
DESCENT	10 000	UP	UP	2 −0.6	IDLE	280		−1 750
DESCENT	0	UP	UP	−0.8	IDLE	280		−1 600
APPROACH	5 000	UP	UP	5.7	59.1	209	VREF40+70	0
APPROACH	5 000	1	UP	5.7	61.5	189	VREF40+50	0
APPROACH	5 000	5	UP	6.2	62.0	169	VREF40+30	3 0

Flap maneuver speeds and VREF

Flap maneuver speeds and VREF are always in the info box whenever the app is used in portrait mode and APP is selected.

APP	⇋
UP	258
1	238
5	208
10	198
20	188
VREF20	182
VREF25	179
VREF30	173

The left column lists the available flap settings for the selected aircraft type.

The right column shows the flap maneuver speeds and VREF.

The weight used for calculation in the weight entered at the Landing weight entry. This is the only input that affects the output. Output is removed for weights below Minimum Inflight Weight and above Maximum Takeoff Weight.

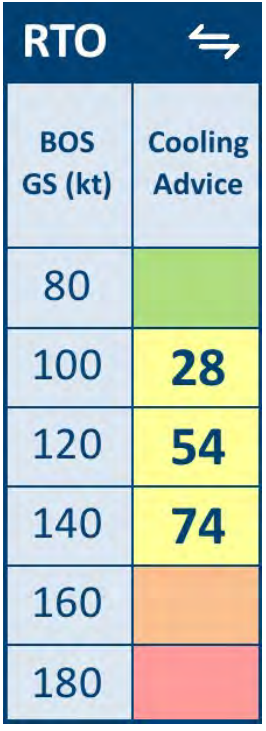
737: Flap 5 and 10 are combined

787: Flap 15, 17 and 18 are not shown.

All speeds are for sea level pressure altitude, except for 787-9 VREF20: 10.000 ft and 787-10 VREF20: 14.000 ft.

Brake cooling advice for rejected takeoff (RTO)

Brake cooling advice for RTO is always shown by the background colour in the info box whenever the app is used in portrait mode and RTO is selected.



BOS GS (kt): This column lists Brake ON Speeds in knots Ground Speed. According the Boeing tables the brake cooling is determined by entering the brake cooling tables with 15°C, sea level.

Cooling Advice: This column lists the Brake Cooling Advice in the event of a rejected takeoff.

The weight used for calculation in the weight entered at the Landing weight entry. This is the only input that affects the output. Output is removed for weights below Minimum Inflight Weight and above Maximum Takeoff Weight.

Brake ON Speed based on Indicated Airspeed is NOT supported.

Notes

Notes includes:

- Landing reference speed as mentioned in the QRH
- Other remarks mentioned in the QRH
- Source information. This is the footer information on the QRH page.
- If the landing weight > Maximum Landing Weight (MLW) a note in RED colour is included stating the overweight condition and the MLW value.
- If the landing weight > Tires Speed Limit Landing Weight (TSLLW) a note in RED colour is included stating the overweight condition and the TSLLW value.
- Exceedance of the Landing Climb Limit Weight (LCLW) is not shown.

WC = Wind component

The value is derived from the wind calculator.

It is the Head- / Tailwind component including gusts.

- WC = – 10 means 10 kts tailwind
- WC = 25 means 25 kts headwind

The value may be entered easily with a single tap on the WC button.

The WC button is available when the Head- / Tailwind entry is active.

ISA

This is the standard temperature at the altitude above sea level (runway elevation).

If the actual temperature happens to be ISA the value may be entered easily with a single tap on the ISA button.

The ISA button is available when the Temperature entry is active.

ADJ (AT OFF) = Adjustment (Autothrottle OFF)

The value is derived from the wind calculator. It uses wind component and wind speed and gusts to calculate the speed adjustment above VREF for landing with autothrottle OFF. The calculation is done in accordance with the Boeing rules.

The value may be entered easily with a single tap on the ADJ (AT OFF) button.

The ADJ (AT OFF) button is available when the Speed above VREF entry is active.

For landings with autothrottle ON a speed adjustment of 5 kts should be used.

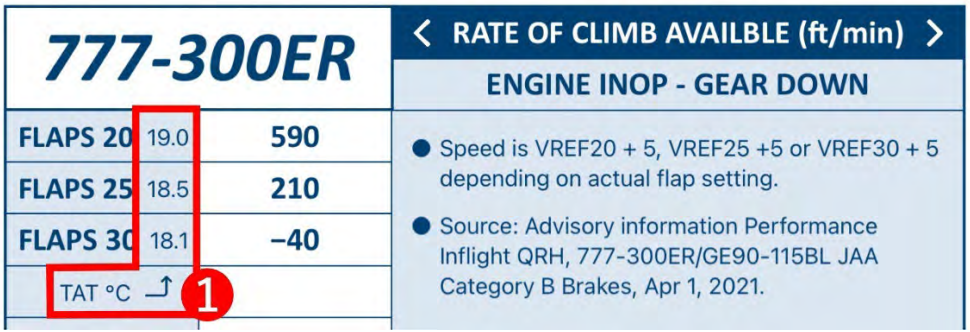
TAT (Total Air Temperature)

TAT (Total Air Temperature) ❶ is displayed in the Gear Down Landing Rate of Climb Available view.

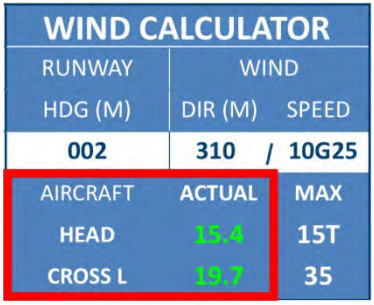
The Gear Down Landing Rate of Climb Available tables call for entry with TAT. The temperature entry however is OAT. Subsequently this app calculates the RRtotal (Total Ram Rise) for VREF + 5 for each flap setting according to this formula:

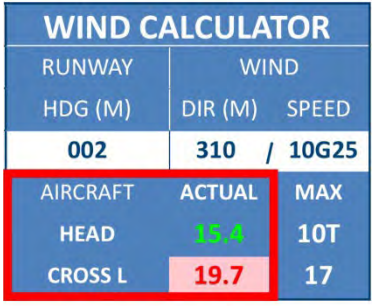
$$RR_{\text{total}} = \frac{V^2}{87^2}$$

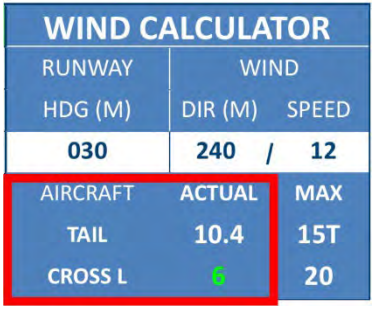
The resultant TAT (= OAT + RRtotal) is displayed as follows:



Wind components







The wind components are displayed at the left lower corner of the wind calculator.

The available information is:

- Head- or tailwind
- Head- or tailwind component
    - Headwind is GREEN
    - Tailwind is
        - WHITE (within limits)
        - RED/PINK background (outside limits)
- Crosswind direction (L or R)
- Crosswind component
    - Crosswind is
        - GREEN (within limits)
        - RED/PINK background (outside limits)

Wind limitations

WIND CALCULATOR		
RUNWAY	WIND	
HDG (M)	DIR (M)	SPEED
002	310	/ 10G25
AIRCRAFT	ACTUAL	MAX
HEAD	15.4	15T
CROSS L	19.7	35

WIND CALCULATOR		
RUNWAY	WIND	
HDG (M)	DIR (M)	SPEED
002	310	/ 10G25
AIRCRAFT	ACTUAL	MAX
HEAD	15.4	10T
CROSS L	19.7	17

WIND CALCULATOR		
RUNWAY	WIND	
HDG (M)	DIR (M)	SPEED
030	240	/ 12
AIRCRAFT	ACTUAL	MAX
TAIL	10.4	15T
CROSS L	6	20

The wind limitations are displayed at the right lower corner of the wind calculator.

The available information is:

- Maximum tailwind
- Maximum crosswind

Factors taken into account for these limitations are:

- Aircraft type
- Aircraft status
  - Reduction of crosswind limits for certain aircraft conditions, e.g. FLIGHT CONTROLS
- Runway conditions
- Reverse thrust
  - 5 kts reduction of max. crosswind in case of asymmetrical reverse on wet and contaminated runways

B737: Autoland tailwind restrictions are NOT accounted for.
B787: EEC MODE in ALTERNATE tailwind restriction is NOT accounted for.

Settings

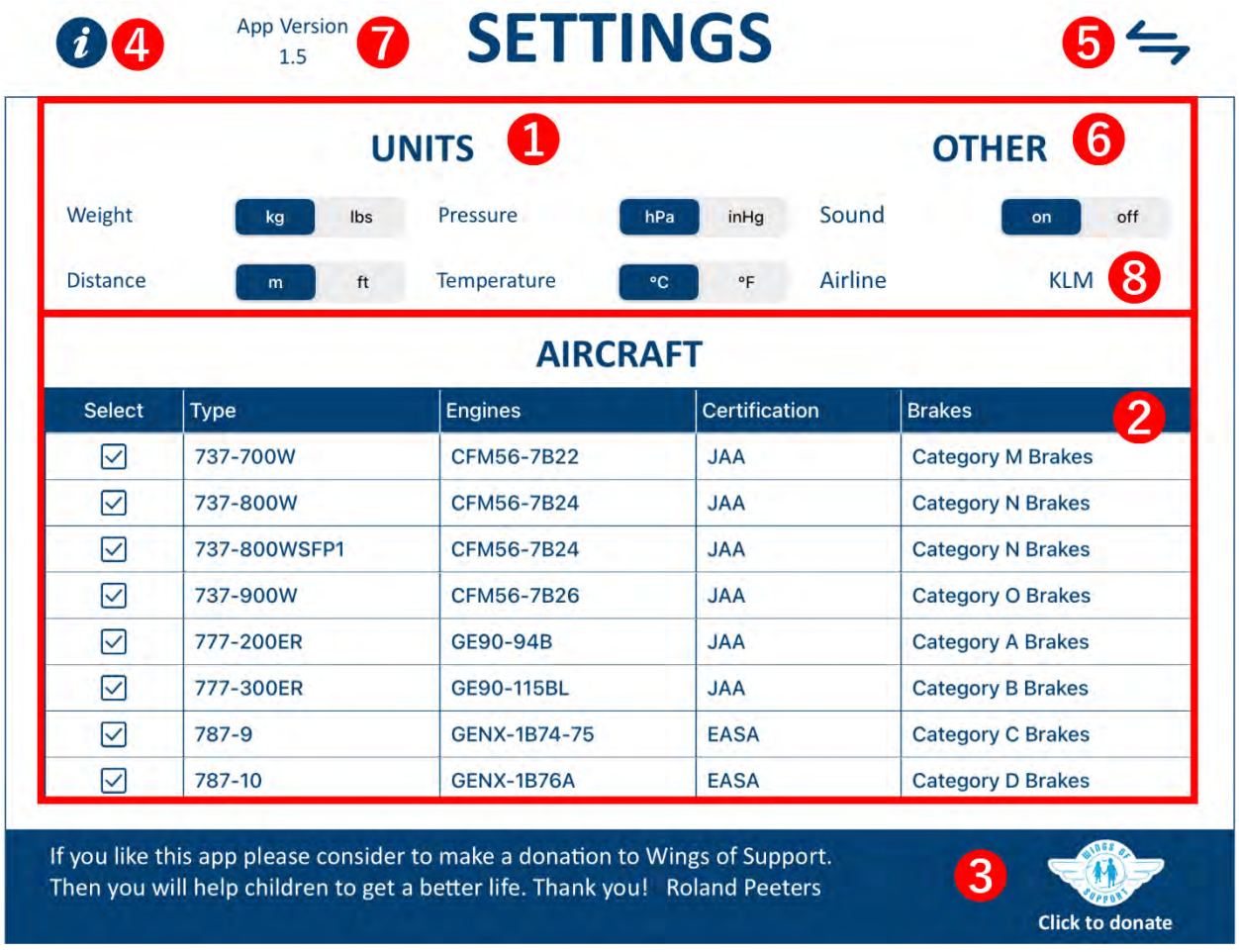
The settings screen consists of:

1. A unit selection area (Weight, Distance, Pressure, Temperature)
2. An aircraft type selection box
3. A link to the donation screen
4. A link to the user manual screen
5. An exchange button
6. A selector which switches on or off the keyboard click sound
7. Version number of the app.
8. Airline selector which allows selection between airline fleets.

The settings can be accessed through the ⚙ symbol on the data entry pad.

When tapping the exchange button the main screen view is restored.

Settings screen lay-out



Weight

Changes the landing weight unit.

Selectable values are kg (kilogram) and lbs (pounds).

The landing weight entry field unit is changed accordingly.

Distance

Changes the landing distance unit.

Selectable values are m (meters) and ft (feet).

The calculated landing distance unit is changed accordingly.

Pressure

Changes the QNH unit.

Selectable values are hPa (hectopascal) and inHg (inches mercury)

Temperature

Changes the temperature setting.

Selectable values are degrees Celsius (°C) and degrees Fahrenheit (°F)

Aircraft

The section below AIRCRAFT shows a table with aircraft types for the selected Airline that are within the app's database.

The left column contains checkboxes. Only aircraft that are checked are visible in the aircraft type selection pad on the main screen.

You may uncheck the boxes for aircraft that you do not use.

It is not possible to:

- deselect all aircraft types. At least 1 type must be selected.
- deselect the aircraft type that was last selected on the main screen.
- If you want to deselect that aircraft type:
    - go to the main screen.
    - select an aircraft type that you do not want to delete.
    - go back to the settings page to deselect the aircraft type.

The list of aircraft matches the current KLM Boeing and British Airways 777 fleet. Select your airline to change the fleet display.

Please note that not only the aircraft type but also the type/model of the engines, the certification basis and type of brakes is included in this table. If your airline also has similar aircraft types please check carefully if the engines, certification and brakes are identical; if not the calculation results will be different. Please refer to Updates for more information.

Do you want your airline to be included in this app? Please send me an e-mail.

Donation

The donation screen is shown as a pop-up over the settings screen.

It becomes visible after tapping the Wings of Support logo.

When tapping outside the pop-up area the settings screen is restored.

3 buttons allow to select an amount of € 5, € 10 or a custom amount. ❶

The active amount is highlighted in orange colour.

Payment by iDeal or credit card is done by tapping the Donate button. ❷

Alternatively, you may donate directly via the Wings of Support website. ❸

Apple does NOT get a share of this payment and 100% of the money will go directly to Wings of Support. For more information about this charity organization please visit wingsofsupport.org/en

Donation screen lay-out

User manual

The user manual screen displays a PDF file and a navigator in the right upper corner❶. The exchange button links back to the settings screen.

Updates

This version of the app contains data for the whole KLM Royal Dutch Airlines Boeing fleet and the British Airways 777 fleet. On request the app could be made suitable for other airlines, other aircraft types and variants. For this please send me an e-mail.

The data in this app is extracted digitally from the QRH; so no manual entry of data has been done. The notes pad in the left hand lower corner of the main screen specifies the source of the data, including the date. This way you can verify if it matches your QRH. When new updates become available I will pursue to publish an update of the app in the app store.

When at start-up of the app an internet connection is available an automatic notification is displayed in case a new version is available in the App store.

My experience has learned that since the certification of the aircraft the landing distances itself are not likely to change and that updates mostly concern other aspects of the landing distance tables.

For latest news on upcoming updates please visit landingdistancecalulator.com.

Revision history

v1.0 (21-09-2021)

- First release

v1.1 (21-10-2021)

- 777-200ER and 777-300ER FUEL QTY LOW, manual speedbrakes double distance correction for manual speedbrakes fixed.
- Changed colours for both day and night modes to reduce contrast and increase readability.
- Invalid input now disables output.
- Landing weight input now valid up to Maximum Take-off Weight. Landing weights above Maximum Landing Weight which do not exceed Maximum Take-off Weight are now shown in RED.
- Changed the keypad click sound to the iOS default sound.
- Fixed donation payment issue.
- Added a function that resets all input to default if the Backspace button is held for 3 seconds.
- Fixed taxi miles entry issue.
- Updated user manual.
- Other minor bug fixes.

v1.1.1 (3-11-2021)

- Fixed Vref ADJ(AT OFF) issue for gusty winds.
- Introduced possibly to turn off keyboard click in settings.

v1.1.2 (12-11-2021)

- Fixed issue with maximum tailwind for B737.
- Settings page: corrected engine, certification and brakes data for B737-700W.
- Updated user manual.

v1.2 (1-1-2022)

- Added portrait mode.
- Added RTO brake cooling advice.
- Notes regarding landing weight exceedances are shown in red colour.
- Minor bug fixes.
- Updated user manual.

v1.2.1 (3-1-2022)

- Fixed a bug in the RTO brake cooling info box.
- Updated user manual.

v1.2.2 (5-1-2022)

- Fixed another bug in the RTO brake cooling info box.
- Updated user manual.

v1.3 (3-2-2022) Major update

- Added an automatic notification if a new version is available in the App store.

- Enabled Fahrenheit settings option.
- Added Landing Climb Limit Weight.
- Added Go-around Climb Gradient.
- Added Tire Speed Limit Landing Weight for 787.
- Added Flight with Unreliable Airspeed tables.
- Added Flap Manoeuvring Speeds.
- Other small app improvements.
- Updated user manual.

v1.3.1 (28-4-2022)

- 777 and 787: Landing Climb Limit Weight now titled Approach or Landing Climb Limit Weight.
- 737: Adjusted Airspeed Unreliable values to match QRH update of 28 April 2022.
- App version number shown on settings page
- Other small app improvements.

v1.3.2 (4-5-2022)

- Minor bug fix.
- Updated user manual.

v1.3.3 (26-10-2022)

- Fixed a landing distance bug for certain non-normal aircraft statuses in combination with braking action Medium to Good or less - and - NO REV.

v1.3.4 (2-11-2022)

- Fixed issue with UNRELIABLE AIRSPEED pitch power table, which was present from v1.3.3.

v1.4 (16-1-2023)

- Added Gear Down Rate of Climb Available.
- Replaced the exchange symbol in the Main output box with backward and forward arrows. So now backward and forward scrolling is available.
- Added checkboxes behind ICING (and if available WIFI) on the LCLW view to incorporate these weight adjustments in the displayed LCLW values.
- Minor app improvements.
- Updated user manual.

v1.5 (13-3-2023) Major update

- Added British Airways 777 fleet. To select British Airways go to the Settings page.
- Added Airline selector on the Settings page.
- Added dropdown menu selector for the main output box.
- Added derived TAT to the Gear Down Landing Rate of Climb Available view.
- Added a +15% check box to the Non-Normal Calculated Landing Distance view.
- Added AUTOLAND check box to the Calculated Landing Distance view. (British Airways only)
- Added permanent shortcuts for Settings, User Manual and Airspeed Unreliable view.

- The Speed above VREF value will turn red for entries from 0 to 4.
- Double clicking the back button now resets the active data field to zero.
- 737: previously QNH change had no effect on landing distances. This now has been changed.
- 737: Maximum Speed above VREF adjustment reduced to 15 kt.
- All types except 787: The advisory ADJ (AT OFF) output now disappears when Aircraft status is Airspeed Unreliable.
- 787: The advisory ADJ (AT OFF) output now disappears when Aircraft status is Flaps + Slats Fail.
- 787: Fixed issue that it was not possible to change Speed above VREF with Aircraft Status Airspeed Unreliable.
- Added What's New on first start-up of a new version.
- Added pop-up to rate the app in the App Store.
- Minor app improvements.
- Updated User Manual.

Source information

The data source used in this app is the QRH and FCOM PI.

Detailed source information can be found in the respective notes boxes.

In a future update the detailed source information will be listed in this section.

Credits

Roland Peeters (Creation & Design)

Joris Zadelhof (Wings of Support)

Sucharu Hasija (iOS implementation)

Rens van Broekhuijsen, Mitch Neve, Anthony Fildes and other pilots (Testing)

Disclaimer

This tool has not been approved for operational use.

Pilots should always refer to approved sources.

By using this app you agree to use it at own risk.