



Brief User Guide

Challenger 850 Program

For program installation help please see <http://www.afmsolutions.com/installing.html>

For getting started help please see <http://www.afmsolutions.com/ipadiphone.html>

When starting the app for the first time you'll have to accept the license agreement in order to continue.

When the app is started, it always shows the Main Menu page as illustrated below. Here, you can tap the Weight & Balance button, Landing button or Takeoff button.



There are several options for the app's background color. Under different lighting conditions certain options may work better than others. The textured background works great in bright daylight, but a darker grey works better in low light situations.

Weight and Balance

Tap the “**Weight & Balance**” button on the main menu to jump to the Weight and Balance form. Then, you can either begin by typing the passengers' weight values or you can use the quick fill method.

To begin entering numbers tap on a white input box of your choice, for example Pax Seat 1:

View Configuration **Challenger 850**

Fill All Seats Fill All Seats 170

Pax Seat 1	0	<input type="button" value="CLR"/>
Pax Seat 2	170	<input type="button" value="CLR"/>
Pax Seat 3	170	<input type="button" value="CLR"/>
Pax Seat 4	0	<input type="button" value="CLR"/>
Pax Seat 5	170	<input type="button" value="CLR"/>
Pax Seat 6	0	<input type="button" value="CLR"/>
Pax Seat 7	170	<input type="button" value="CLR"/>

Baggage 1
Baggage 2
Baggage 3

A built-in keypad will appear so you can start typing. To move to the next box press the “Next” button:

Proposed Weight ... 15500 Flaps Retraction - Vfr 166 Kts

Use Proposed Weight Max. Cont. Thrust - Side 97.7 %
Max. Cont. Thrust - Center 97.7 %

Runway Condition
Dry Runway

Required SID Gradient

Obstacle

None

Aircraft Configuration
Flaps Anti-Ice Setting

1 2 3 4 5 6 7 8 9 0

- / : ; () \$ & @ Go

#+= undo . , ? ! ' " #+=

ABC ABC

The quick fill method:

1. Select the pre-determined passenger weight from 125 lb to 200 lb.
2. Tap the yellow “**Fill All Seats**” button. Then tap the “**CLR**” button next to any vacant seat.

Challenger 850

View Configuration

Fill All Seats **2**

Clear All

Fill All Seats With: **170** lb **1**

Clear All

Pax Seat 1	0	CLR
Pax Seat 2	170	CLR
Pax Seat 3	170	CLR
Pax Seat 4	0	CLR
Pax Seat 5	170	CLR
Pax Seat 6	0	CLR
Pax Seat 7	170	CLR
Pax Seat 8	170	CLR
Pax Seat 9	0	CLR
Pax Seat 10	0	CLR
Pax Seat 11	170	CLR
Pax Seat 12	170	CLR
Pax Seat 13	0	CLR
Pax Seat 14	0	CLR
Pax Seat 15	0	CLR

Baggage 1: 100 CLR

Baggage 2: 0 CLR

Baggage 3: 120 CLR

Fuel Amounts (RAMP)

Main (9380 lb Max)	8,800	CLR
Center (4925 lb Max)	4,925	CLR
Aft (3973 lb Max)	3,973	CLR
Taxi Fuel Used	250	CLR

Fuel Amounts (at Landing)

Main (9380 lb Max)	4,000	CLR
Center (4925 lb Max)	1,000	CLR
Aft (3973 lb Max)	0	CLR

Show Total Weight **3**

Ramp Weight	52908
Takeoff Weight	52658
Landing Weight	40210
Zero-Fuel Weight	35210

Go

CHALLENGER 850

Ver. 1.0.0

Takeoff Landing Main Menu

3. Press the “**Show Total Weight**” button at any time to the current Ramp Weight, Takeoff Weight, etc.

When finished typing just press the green "Go" button to see the computed results.

Back To Input **Within Limits**

Takeoff Trim Setting: 5.7
Landing Trim Setting: 6.8

 ZERO-FUEL:
Weight (lb).....35210
C.G. (%MAC).....21.5
Forw. Limit(%MAC).....9.8
Aft Limit (%MAC).....33.8

 RAMP:
Weight (lb).....52908
C.G. (%MAC).....24.7
Forw. Limit(%MAC).....7
Aft Limit (%MAC).....26.7

 TAKEOFF:
Weight (lb).....52658
C.G. (%MAC).....24.7
Forw. Limit(%MAC).....7.1
Aft Limit (%MAC).....28.6

 LANDING:
Weight (lb).....40210
C.G. (%MAC).....17.5
Forw. Limit(%MAC).....8.5
Aft Limit (%MAC).....35

Number of Passengers.. 7

---Structural Limits (lb)---
Max. Ramp Weight.... 53250
Max. Takeoff Wgt.... 53000
Max. Landing Wgt.... 47000
Max. Zero-Fuel Wgt.. 44000

W & B Envelope - Ver. 1.0.0

Max. T.O. Weight
Max. Landing W.
Max. Zero-Fuel W.

■ Takeoff ■ Landing ■ Zero-Fuel

All Weight units are in Pounds
All CG units are in % M.A.C.

Email Options

Takeoff **Landing** **Main Menu**

The red square represents the Takeoff CG location, the blue square represents the Landing CG location and the yellow square represents the zero-fuel CG location.

The **Ramp Weight**, moment and CG values are also computed, but they are not shown in the diagram. However, if the ramp weight , cg or moment is out of limits a warning message will appear on the screen.

Takeoff

Enter the required airport and weather information. The values will default to zero if left blank.

1. The runway length and the altimeter setting fields cannot be zero.

The altimeter setting can be entered in several ways for your convenience. For example for standard conditions you can type “29.92” or “2992” or you can use a metric value of “1013”

Challenger 850 - Ver. 1.0.0
 Airport ID: () Runway: ()

Obstacle Limited!
Max. TOW Allowed 45091 lb

Takeoff Field Length	6379 ft
Net 2nd. Seg. Gradient	2 %
Takeoff Thrust N1	90.8 %
Pressure Altitude	4000 ft
Deviation From ISA Temp.	22.9 °
HeadWind Component	20 Kts
V1	132 Kts
VR	132 Kts
V2	135 Kts
APR Thrust Setting	92.8 %
Max Continuous Thrust	91.1 %
Return - Vref	138 Kts
Net Final Seg. Gradient	3.4 %
Final Seg. Speed	174 Kts
(Brake Energy) - V1mbe	175 Kts

Use Proposed Weight Clear All

Required SID Gradient: **Obstacle** (3)

Obstacle True Height (ft): 1,200 (CLR)

Obstacle Distance (ft): 66,000 (CLR)

Obstacle Distance Is In: Nautical Miles / **Feet** (4)

Runway Condition: **Dry Runway**

Aircraft Configuration:

- Flaps: 8° Flaps, 20° Flaps
- Anti-Ice Setting: OFF, Cowl Only, Cowl & Wing
- 10th Stage Bleeds: Closed, Open
- APR: OFF, ARMED

Landing | © 2009-2013 AFM Solutions | Ver. 1.0.0 | Main Menu

2. If the “Use Proposed Weight” box is checked, the program will use the weight found in the “Proposed Weight” box. If left unchecked, the program will find the maximum allowable takeoff weight for the given conditions.

3. If there are no obstacles to clear and no required SID gradient, press the “None” button.

If there is an obstacle, enter the obstacle true height above the runway surface in feet. Then enter the obstacle's distance from the end of the runway (DER).

4. You have the option to enter the distance in feet or in nautical miles.

5. Press the “View Details” button to see the details of all the weight limitations encountered and the flight path details

V11	V12	V13
30	CLR	
0	CLR	
20	CLR	
39,697	CLR	
V2	135	Kts
APR Thrust Setting	92.8	%
Max Continuous Thrust	91.1	%
Return - Vref	138	Kts
Net Final Seg. Gradient	3.4	%
Final Seg. Speed	174	Kts

Takeoff Data Details	
Weight Limit due to Runway Length	51352 lb
Weight Limit due to Climb Requirements	46997 lb
Weight Limit due to Brake Energy.....	53000 lb
Weight Limit due to Obstacle or SID	45091 lb
Weight Limit due to Tire Speed	53000 lb
Obstacle Clearance Height Reached During the Final Segment	
First Segment Climb Gradient	2.2 %
Maximum Gross Level-off Height	1684 ft
Gross Level-off Height	1684 ft
Level-off Pressure Altitude	5560 ft
Net Acceleration Distance	10125 ft
Net Acceleration Distance	1.7 nm
Distance From Reference Zero	69464 ft
Distance From Reference Zero	11.4 nm
Remaining Unused Runway Distance	3464 ft
Required Climb Gradient Due to Obstacle	3.3 %

Tap inside this box to close

If a computed weight limit value is less than the MTOW then it is shown in red.

Note that the maximum continuous thrust is always computed at the pressure altitude and temperature of the level-off height. The calculated value of the level-off pressure altitude is always adjusted for any deviation from ISA temperature.

When it is required to clear an obstacle, the program will always find the highest possible weight that will allow the **net flight path** to clear the obstacle by a **minimum of 35 feet**.

The first and second segment climb gradients are always computed. The **net level-off height** is normally equal to obstacle height + 35 ft. If the corresponding **gross level-off height** is higher than the maximum allowed gross level-off height, then the program finds an optimum lower height. In that case a full flight path is computed. The program calculates the height reached in the 1st. segment, 2nd. Segment and final segment. It also calculates the horizontal distance travelled during each segment as well as the horizontal acceleration distance required during the transition segment.

The main values are then displayed in the details box. To close this box, just tap anywhere inside the box.

The minimum required climb gradient is optimized by adding any extra runway distance to the original obstacle distance.

Landing

If the aircraft has to make an emergency landing immediately after takeoff, you can quickly transfer all the airport and weather information from the takeoff form into the landing form by pressing the “**Copy Data From Takeoff Form**” button near the top of the form.

Copy Data From Takeoff Form

Challenger 850 - Ver. 1.0.0

Airport ID: () Runway:()

Airport & Weather Information

Field Elevation.....

Runway Heading.....

Runway Length.....

Runway Slope.....

Altimeter Setting.....

Temperature.....

Wind Direction.....

Wind Speed.....

Weight

Aircraft Configuration

Anti-Ice Setting

Cowl Only

10th Stage Bleeds

Open

Runway Condition

Wet Runway
▼

Weight Limited By:

By Land. Distance	46343	lb
By Climb Req. Flaps 8	52949	lb
By Climb Req. Flaps 20	49274	lb
By Brake Energy ¹	50105	lb

¹Maximum Permissible Quick Turn-Around Landing Weight

Landing Speed - Vref	132	Kts
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Other Landing Data:

Appr. Climb Gradient (Flaps 8)	5.5	%
Appr. Speed Vapp (Flaps 8)	140	Kts
Appr. Climb Gradient (Flaps)	4.3	%
Appr. Speed Vapp (Flaps 20)	129	Kts
Landing Climb Gradient	9.2	%
Landing Climb Speed	127	Kts
Go-Around Thrust Setting	92.8	%

Wet/Contaminated Rwy. Values:

ACTUAL LANDING DISTANCE	5368	ft
FACTORED LANDING DIST. (60%)	8947	ft

Landing Distance - Wet (1.92 Factor)

LANDING DISTANCE	8966	ft
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Takeoff

Ver. 1.0.0

Main Menu

If the “Weight” box is left blank, the program will use the structural maximum landing weight allowed.

If any of the Dry-Runway results are out of range they will be shown in red. In the example above, the factored landing distance of 7797 feet is greater than the runway length.

When wet or contaminated runway is selected, the program will always display the **dry-runway** values first. It will also show the **wet/contaminated** runway landing distance near the bottom of the form. The last line shows the "Wet Distance – 1.92 Factor". That is the dry-runway landing distance divided by 0.6 and then multiplied by 1.15.

Aircraft Configuration (Weight and Balance)

To view or modify the aircraft configuration, press the "View Configuration" button near the top of the weight and balance form. The W&B configuration form will show.

The screenshot displays the "W&B Config." form with the following elements:

- Navigation:** "Return" button on the left and "Next Page" button on the right.
- Configuration Summary:** Two dropdown menus. The first is set to "15" and labeled "- Total No. of Seat Stations". The second is set to "3" and labeled "- Total No. of Bag. Stations". A red "1" and a yellow arrow point to the first dropdown.
- Enter Seat Station Names:** A list of 15 rows, each with a "Seat" label (Seat 1 to Seat 15), a text input field containing "Pax Seat X", and a "CLR" button. A red "2" and a yellow arrow point to the first input field.
- Enter Bag. Station Names:** A list of 5 rows, each with a "Bag. X" label (Bag. 1 to Bag. 5), a text input field containing "Baggage X", and a "CLR" button. A "Clear All" button is located below this section.
- Weight and Balance Data:** Two rows with text labels, text input fields, and "CLR" buttons. The first row is "B.O.W. (lb)" with the value "33,800". The second row is "B.O.W.Arm (In)" with the value "521".
- Buttons:** A red "Save" button is located below the weight and balance data. A "Clear All" button is located at the bottom center of the form.
- Version:** "Ver. 1.0.0" is displayed at the bottom right.

To return back to the weight & balance form press the blue **“Return”** button. To move to the second page press the blue **“Next Page”** button.

Here, you can change the number seats present in your aircraft, the number of baggage areas present, B.O.W. weight etc.

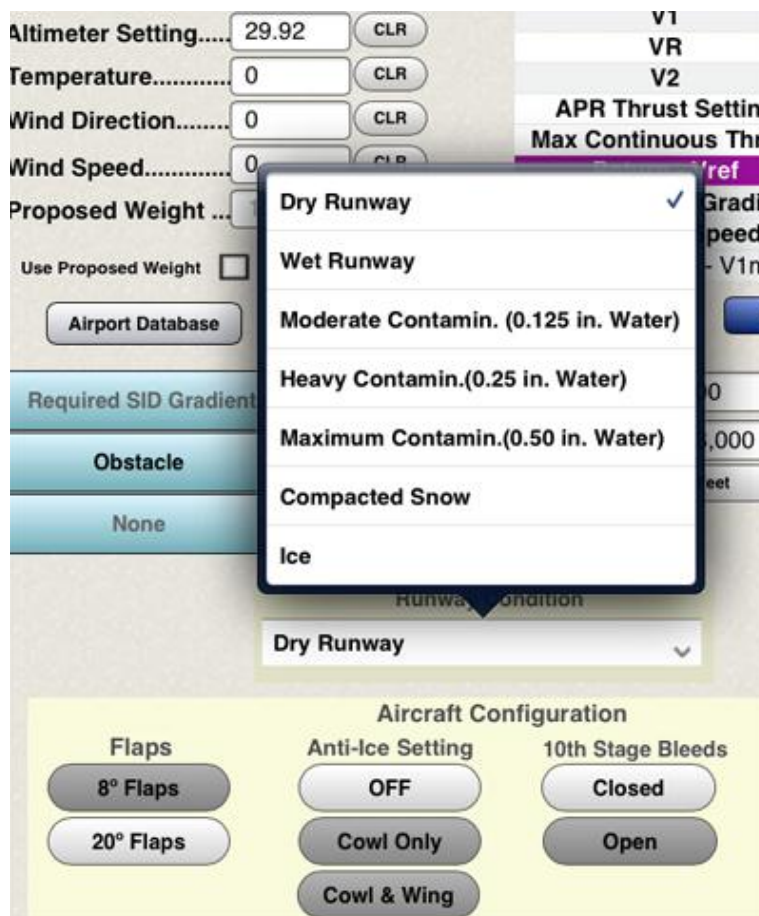
1. This box lets you select how many passenger seats your aircraft uses.
2. You can rename the seats or baggage areas if needed.

For example if the first seat is a flight attendant seat, just tap the **“Pax Seat 1”** box and change it to **“Jump Seat”** or **“Flight Attendant”**. After you have made all the necessary changes, press the red **“Save”** button. Then return to the program.

If your aircraft has more than 15 seats please contact AFM Solutions so adjustments can be made to the program.

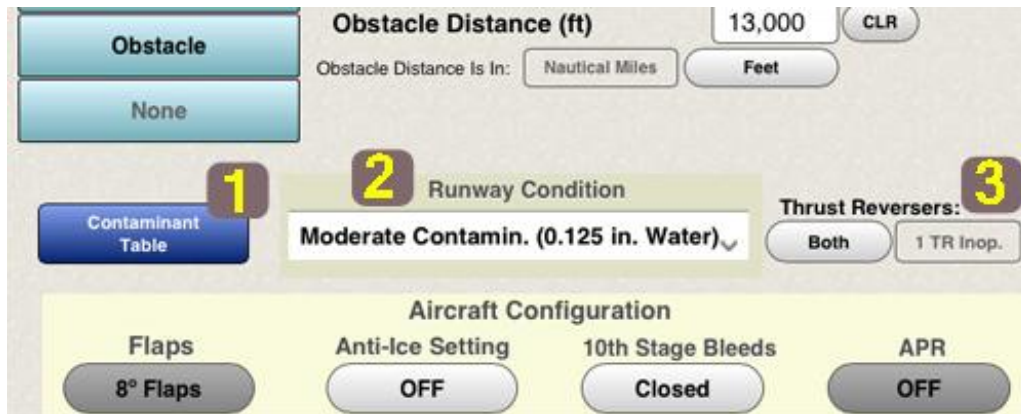
Using the Contaminated-Runways Data

Tap on the **“Runway Condition”** box in the Takeoff form to see the different types of contaminants available



If you selected Wet or Contaminated Runway options, you will also be able to select the number of operating thrust reversers (item 3 below). Your choices will be “Both Reversers Operating” or “One Reverser Inoperative”.

To the left of the runway condition box (item 2 below) there will be a blue button labeled “Contaminant Table” (item 1 below)



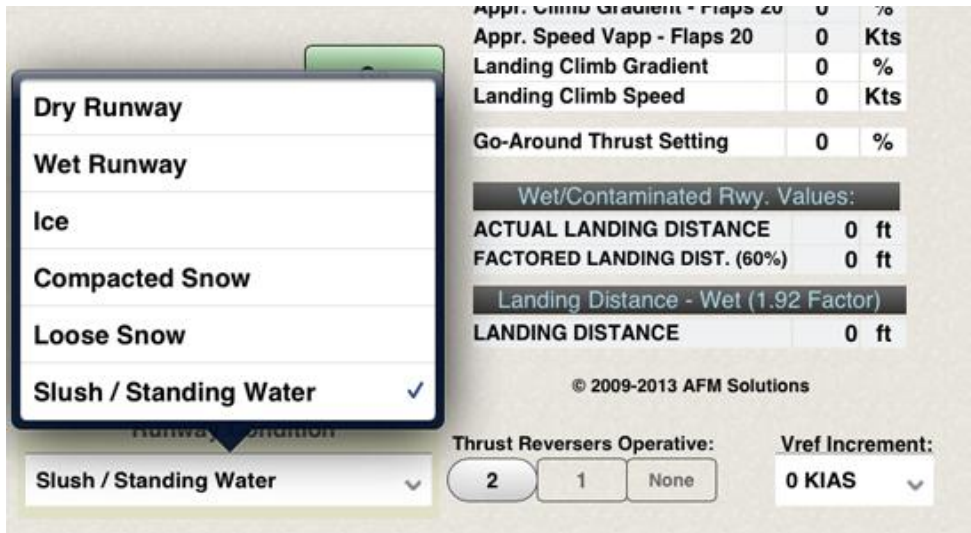
Tap this button to see a table displaying the different types of contaminants:



Any time a contaminated runway option is selected, the program will calculate the weight limit due to field length for dry runway first. Then this value will be used to compute the corrections required for contaminated runway. If there is a clearway present, the program automatically takes it into account. The clearway correction is not used when the charts are used in reverse for computing the takeoff distance, as directed by the AFM.

If for the purpose of obtaining more conservative results one does not wish to use the available clearway, simply enter the value of zero feet for clearway in the input section.

Tap on the **“Runway Condition”** box in the Landing form to see the different types of contaminants available



If you selected Wet or Contaminated Runway options, you will also be able to select the number of operative thrust reversers. Your choices will be "2 Reversers Operative, 1 Reverser Operative, or None Operative".

You can also select the Vref increment used so that the program can apply the proper correction for Landing Distance.

