

OPT USER'S MANUAL




Revision 23

02 February 2017


Intentionally Blank


General


The following general guidelines apply when using the Onboard Performance Tool (OPT) – Takeoff and Landing Modules:

- Pull down menus are represented using a horizontal arrow in the field: 

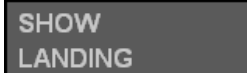
- Use the laptop scratch pad to navigate among pull down menus or buttons.

- Non-selected fields appear in white letters over a grey background: 

- Active selected fields appear in green letters: 

- Inactive fields appear in blue letters with a blue box: 

- To launch the Landing Module select SHOW LANDING (Refer page 29 onwards for detailed information about the Landing Module)



To close OPT, select **EXIT**.



MAIN PAGE

The main page in OPT is set up in three basic functional areas as follows:

- The centre part of the screen is for input.
This portion of the screen is used for airport/runway information input, airplane configuration input, and other miscellaneous inputs. Modification of any input will blank out results/ erase output data.
- The lower part of the screen is for output.
This portion of the screen provides output data such as speeds, power setting, flaps and assumed temperature value.
- The bezel keys are for actions.
Actions to execute the selected inputs, view various supplementary information or data, change data, or display of alerts are shown in this column.

MEL/CDL items and NOTAM entries are done via these keys. Runway and intersection information can also be reviewed. These functions are discussed later in this manual.

For every takeoff and landing calculation, the value for each input parameter will have to be entered or selected, in accordance with Standard Operating Procedures and conditions at the time.

Following is the default screen shot of the Main Page of OPT Takeoff Module:

PERFORMANCE - TAKEOFF DATA

A6-ECM

RWY INFO	ARPT <input type="text" value="ARPT SEARCH"/>	FLAPS CONFIG <input type="text" value="FLAPS"/>	CALC
NOTAMS	RWY <input type="text" value="RUNWAYS"/>	A/C CONFIG <input type="text" value="A/C"/>	SHOW ATM
SHOW KYBD	INTX <input type="text" value="INTX"/>	A/I CONFIG <input type="text" value="A/I"/>	MEL
	COND <input type="text" value="RUNWAY CONDITION"/>	CG CONFIG <input type="text" value="CG"/>	CDL
	WIND <input type="text"/>	THRUST RATING <input type="text" value="RTG"/>	
	OAT <input type="text"/>		
	QNH <input type="text"/>		
	ATOW: <input type="text" value="KG"/>		
SHOW LANDING			
EXIT			

Bezel

Input

Bezel

PERFORMANCE - TAKEOFF DATA

A6-EBA

ARPT	12R/K2	FLAPS	5
RWY	12R/K2	AVC	
INTX	12R/K2	A1	
COND	12R/K2	CG	
WIND	150/7 KT	RTG	
(6 HW/4 XW) KT			
OAT	35 C		
(95 F)			
QNH	1005.0 HPa		
(29.68 IN HG)			
ATOW	321500 KG		

SEL TEMP	ACCEL HT	FLAPS	V1	176 KT
47 C	1000 ft AGL	5		
%NT Setting	RWY / INTX		VR	182 KT
97.5	12R/K2/M5B		V2	186 KT
TOOW		VREF3		173 KT
321500 KG				

ATM

EOP - DCT TO ULDOT(25.6.1, E055.38.1) AND HOLD INBD 120 DEG LEFT TURN

Output

RUNWAY/ATMOSPHERIC INPUTS

- Click on the **ARPT** button on the “Performance–Takeoff Data” page.

SEARCH IDENT ① will search for an airport based on ICAO or IATA code.

SEARCH ALL ② will search for an airport based on ICAO or IATA code, plus the airport or city name.

NOTE: On the airport search page, if the search returns only one airport, it is automatically selected and the user is returned to the main performance page.

E.g. If the crew uses the exact ICAO code to select an airport (e.g. OMDB), only one airport option is available hence the OPT will select OMDB and then automatically returns to the main performance page.

- Select the applicable runway.

Select the appropriate runway by clicking **RWY** on the “Performance–Takeoff Data” page. The available list of runways will appear.

If a user entered NOTAM is active, an amber bar will appear below the **NOTAM** bezel key.



- Select an intersection if necessary.

Once the applicable runway is selected, if intersections are available, the **INTX** button will activate and default to **FULL XXY**, where XXY is the selected runway. If no intersections are available, the button will display **NO INTX**. Click on the **INTX** button to display the list of available intersections.

PREVIOUS

NEXT

SEARCH
IDENTSEARCH
ALL

CANCEL

SYMB

SHIFT

A

B

C

D

E

'

,

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F

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J

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SP

CLR
FLD

/

BKSP

1

2

RUNWAY and ATMOSPHERIC INPUTS (cont)

ARPT	OMDB	OPTIMUM
RWY	12L	PACKS AUTO
INTX	FULL 12L	ALL
COND	DRY	FULL 12L
WIND		M3
OAT		EXIT

If **ALL** is selected, data for the full length plus all the available intersections will be computed.

If **FULL** is selected, data for the full length will be computed.

If more than three intersections exist, **ALL** is replaced with the option **FIRST 4**. This selection provides the full length plus the first three intersections from the list.

If only a particular intersection is selected, then just the data corresponding to that intersection will be computed.

Once one of the above options is selected, the **INTX** field turns green.

The **EXIT** button closes the drop-down list and returns to the main screen.

RUNWAY and ATMOSPHERIC INPUTS (cont)

- Verify in OPT – RWY INFO that OPT runway distances for the runways(s) in use do not exceed published runway distances. If an intersection takeoff is considered, confirm intersection characteristics, including displacements lengths, by selecting the INTX button on the RWY INFO page.
- If the actual departure runway/intersection should differ from the one(s) used for the RTOW calculation, OPT departure runway distances must be verified before performance data may be accepted.
- Select the applicable runway condition.
The selection to be made must be based on the 'Performance Basis' (and where applicable, "Depth'). Refer to FCOM SP 16 Operations Wet or Contaminated Runways.

The default runway condition is **DRY**.

If **DRY SNOW**, **SLUSH**, or **STANDING WATER** is selected, the user will be prompted to enter a specific depth. The depth can be specified in mm or inches. In accordance with FCOM SP 16 definitions, enter depths within the following ranges:

Dry Snow	> 3 mm and <= 100 mm
Slush	> 3 mm and <= 13 mm
Standing Water	> 3 mm and <= 13 mm

If the actual depth is less than the lower figures, treat the runway as WET.

If the actual depth is in between the lower and higher figures treat runway as contaminated.

If the actual depth is greater than the higher figures, take-off is not allowed.

- Enter the reported wind direction and magnitude separated by “/”, for example “150/10”. The calculated headwind or tailwind and crosswind component will be displayed just below the wind entry box.
- Enter the OAT in degrees Centigrade or Fahrenheit. The alternative unit OAT will be displayed below the OAT entry box.
- Enter the QNH. The QNH values can be entered either in Inches of Mercury (in HG) or in hector-Pascal (hPa). The alternative unit QNH will be displayed below the QNH entry box.

AIRPLANE CONFIGURATION

- Select the flaps setting.

The preferred setting is **OPTIMUM**. This allows OPT to produce the best performance calculation.

Although a specific flap setting can be selected, it is preferred to allow OPT to determine the best flap setting for takeoff.

- Select the pack, anti-ice, and CG (appropriate to reported T/O MAC), thrust rating (RTG) from their corresponding pull down menus.

The most commonly used settings are:

Air Conditioning Packs - **AUTO**

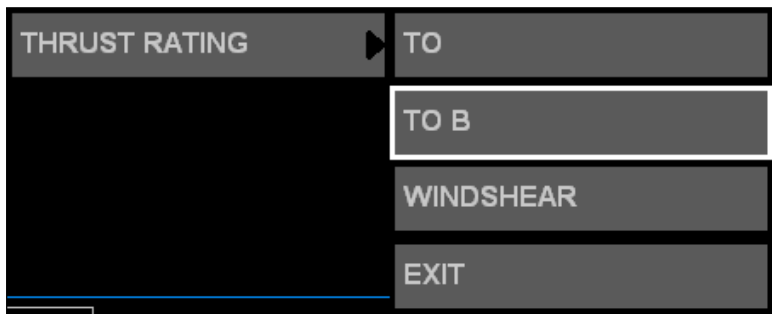
Anti-Ice Bleeds - **AUTO**

CG Position - **FULL CG**

RTG – TO, This is the standard thrust selection for all the 777 fleet. (Includes no Thrust Bump)

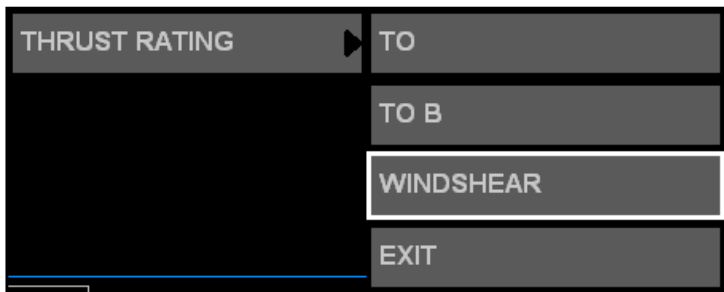


RTG – TOB (applicable only to the certain 777 aircraft fitted with Thrust Bump option). This selection utilizes the thrust bump feature for takeoff performance calculations. Ensure that TO B has been selected through the FMC as per the Supplementary Procedure when utilizing this option.

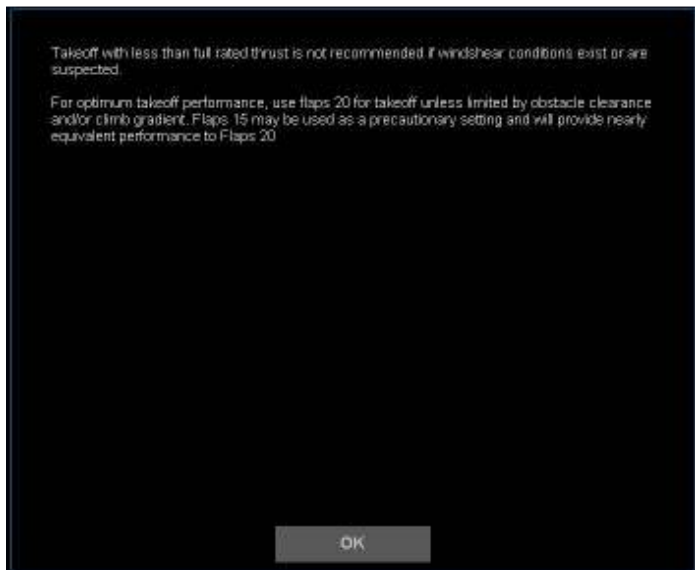


When Takeoff Bump is selected, additional takeoff thrust is provided at pressure altitudes between -2000 and 3000 feet at ambient temperatures between 32 °C and 53 °C. Outside this range the selection of takeoff bump has no effect on takeoff performance. Reduced takeoff thrust operations (assumed temperature method) are not permitted in combination with Thrust Bump.

RTG – WINDSHEAR, This selection provides Windshear guidance feature for takeoff performance calculations.



When WINDSHEAR option is selected for takeoff computation, it automatically selects full thrust and, when Vspeeds are being generated, displays an informational screen to the user which includes standard Boeing-recommended flap positions. (Ref screen shot below)



(Note: - FLAPS = OPTIMUM will provide the optimum flap position for the computation. If required, change the flap selection to Flaps 20 or Flaps 15 as per the FCOM Supplementary Procedures to calculate the takeoff performance data)

The OPT will display the Windshear thrust rating button label in amber and display a recommended Windshear V_R in amber below the standard V_R . This new V_R will comply with the Windshear guidance of increasing V_R by as much as 20 kts above the standard V_R . (Ref screen shot below).

PERFORMANCE - TAKEOFF DATA

AD-EBA

RWY INFO	ARPT: 1000 - 1200	OPTIMUM	FLAPS	CALC
	RWY: 100	PAUSE AUTO	A/C	
	INTX: 10000	ENGINEING AUTO	A/I	SHOW ATM
	COND: 100	FINAL CRG	CG	
NOTAMS	WIND: 150/7 KT (6 HW/4 XW) KT	WINDSHEAR	RTG	MEL
SHOW KYBD	OAT: 35 C (95 F)			CDL
	QNH: 1005.0 HPa (29.68 IN HG)			12R/K2/M5B NO ATM
	ATOW: 321500 KG			
SHOW LANDING	TOGA	FMC MIN ACCEL HT	FLAPS	V1
	1000 ft AGL		5	172 KT
	%NT Setting	RWY / INTX		VR
	104.5	12R/K2/M5B		180 KT
	TOGW			V2
	321500 KG			187 KT
EXIT				VREF30
				173 KT

EOP - DCT to ULDOT (N25 6.1, E055 38.1) AND HOLD INBD 120 DEG LEFT TURNS

Miscellaneous

- Enter the Actual Takeoff Weight (ATOW) in the **ATOW** text box.
Values are accepted in kilograms or tonnes; the suffix “KG” will be appended automatically, once the input has been accepted by the OPT software.

If this text box is left blank, the OPT will provide TOGA performance data only.

CALCULATION AND RESULTS

- Click on the **CALC** ③ bezel button to perform the takeoff analysis. All fields must be filled before the **CALC** bezel key becomes active.



While the calculation is in process, a progress bar will be displayed in each runway or runway intersection box.

Only attempt to access the results after the progress bars have completed and changed to runway information boxes ⑥.

Computation times may take as long as 2 minutes depending on the selections and actual conditions.

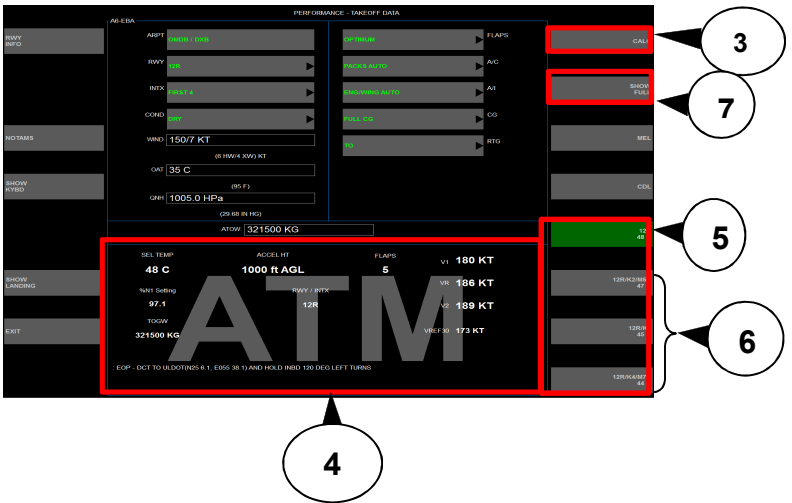
- Takeoff data shown in ④ corresponds to the runway or intersection depicted in the green background bezel key ⑤.

The data in the label on this bezel key is as follows:

RWY ID
SEL TEMP *or* Max TOW

SEL TEMP is shown if an ATOW has been entered.

Max TOW is shown if no ATOW has been entered.



CALCULATION AND RESULTS (cont)

- The other bezel keys grouped under ⑥ are for the runway intersections. These appear if:
 - Intersections exist for the selected runway, *and*
 - Either the option **ALL** or **FIRST 4** was selected from the **INTX** drop-down menu.

These intersections can be accessed by clicking on the appropriate bezel key.

- Calculation of TOGA and reduced thrust values are governed by the parameter **ATOW**.

If no ATOW is entered, OPT will assume a TOGA takeoff and compute the performance limited weight (TOGW) and the corresponding V-speeds (V1 VR V2), the minimum flap retract altitude (ACCEL HT), EPR or N1 setting for TOGA and VREF. A TOGA text box is displayed in the output section, upper left hand corner.

No watermark is added for such a calculation.

If an ATOW is entered, OPT will compute data for both TOGA and the maximum assumed temperature (SEL TEMP). The parameters generated are the same for both with the exception of SEL TEMP.

Please note that in this case, OPT will initially default to the SEL TEMP computation.

TOGA data can be accessed by selecting the bezel key SHOW FULL ⑦. After selecting this bezel key, the label will change to SHOW ATM. Selecting the SHOW ATM bezel key will return the output to the maximum assumed temperature data and the bezel key label will return to SHOW FULL.

“FULL” and “ATM” watermarks are added to the take-off output area to denote Full-rated thrust and Assumed temperature outputs respectively. This assists in reducing user confusion as to which output they are referring to.

Note:-

There are very slight differences between the calculation methods of the OPT and the FMC. As well, calculations of Vref30 are compensated for non-standard pressure, by means of QNH input, in the OPT. Because of this, there might be differences of up to +/- 1 knot between the Vref30 of the OPT and the Vref30 of the FMC on the APP REF page.

- If optimum flaps are selected, OPT will provide the flap setting which results in the best performance for all the conditions used.
- The engine-out procedure (EOP) appropriate to the selected runway is published at the bottom of the output panel ④.

Output format when ATOW is not entered (TOGA Thrust)

ATOW: <input style="width: 150px; height: 20px;" type="text"/>			
TOGA	ACCEL HT 1000 ft AGL	FLAPS 15	V1 167 KT
EPR Setting 1.525		RWY / INTX 12R	VR 176 KT
TOGW 300270 KG			V2 181 KT
			VREF30 167 KT

Output format when ATOW is entered

ATOW: <input style="width: 150px; height: 20px;" type="text" value="321500 KG"/>			
SEL TEMP 48 C	ACCEL HT 1000 ft AGL	FLAPS 5	V1 180 KT
%N1 Setting 97.1		RWY / INTX 12R	VR 186 KT
TOGW 321500 KG			V2 189 KT
			VREF30 173 KT

ATM

EOP - DCT TO ULDOT(N25 6.1, E055 38.1) AND HOLD INBD 120 DEG LEFT TURNS

- OPT does apply temperature corrections to the displayed minimum flap retraction heights (ACCEL HT)

NOTAMs

OPT provides the facility for entering NOTAMs input via the **NOTAMS** bezel key.

NOTAMs can consist of either the shortening of declared runway distances from any of its two ends or the addition of *one* obstacle. OPT allows the user to apply such changes via the **NOTAMS** bezel key on the PERFORMANCE-TAKEOFF DATA page.

When NOTAM runway length reductions are applied from the lift-off end of the runway, clearway and stopway credits for that runway direction are not used.

While entering the temporary/NOTAM obstacle information in the OPT, obstacle **DISTANCE** and the **HEIGHT** should be referenced to "**RUNWAY START**" only.

DO NOT use the options "Lift-off End" and "Sea Level" as they can provide incorrect performance figures.

CO-NOTAMS issued from Flight Ops Performance regarding NOTAM obstacles will always be referenced to "Runway Start".

For NOTAMs, a company NOTAM will typically be issued instructing crews on the exact steps to follow.

- Users apply these changes via the **NOTAMS** bezel key on the "Performance-Takeoff Data" page.
- Select the bezel key **COMPLETE** to activate the NOTAM, or **CANCEL** to exit without changing.
- If there are any active NOTAMs entered, an amber bar will appear directly below the **NOTAM** bezel key on the PERFORMANCE – TAKEOFF DATA page:



NOTAMs remain active until cleared. These can be cleared by selecting the bezel key "CLEAR ALL".

RWY
INFO

Dubai Intl - OMDB / 12R

Shortening from runway start (m)

Shortening from liftoff end (m)

Landing distance shortening (m)

COMPLETE

CANCEL

NOTAMS

OBSTACLE

Obstacle height (ft)

Obstacle distance (m)

SHOW
KYBD

Comments:

To clear all active
NOTAMS

SHOW
LANDING

DISTANCE UNITS

Feet

Meters

HEIGHT UNITS

Feet

Meters

OBSTACLE DIST REF

Runway Start

Liftoff End

OBSTACLE HT REF

Runway Start

Liftoff End

EXIT

CLEAR
ALL

CLEAR
INPUTS

MEL

It may be necessary to dispatch an aircraft with inoperative items using the MEL. The **MEL** page allows the user to account for any item affecting aircraft takeoff performance.

CAUTION: Operating restrictions may apply that are outside the scope of the OPT program. The MEL must be reviewed when applying performance penalties in OPT.

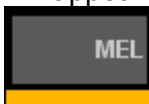
- Click on the **MEL** bezel button to access the MEL page.
- Select the applicable ATA chapter number via the drop down menu.

Each ATA chapter tab contains the MEL which gives a performance penalty. Check the applicable box associated to the MEL item. When a selection is made, OPT indicates the MEL item has been used by adding a tick () next to the ATA number. Multiple MEL items may be allowed.

Consult the MEL for the validity of multiple selections.

- Click on **COMPLETE** after the selection of inoperative items is done.

If there are any active MEL items selected, an amber bar directly below the MEL bezel key will appear on the main page:



Selected MEL items remain active until deselected. Un-tick green tick and press **COMPLETE** button to deselect particular MEL items that are previously selected

MEL 777-300ER GE90-115BL

PREVIOUS

COMPLETE

NEXT

CANCEL

32 Landing Gear

MEL

 -08-01C PSEU 1 on right bus / PSEU 2 on left bus -08-01D 2 PSEU Channels Inop / Gear Secured Down -30-01 Landing Gear Actuation System -30-02 Semi-Lever Gear System -35-01 Landing Gear Alternate Extend System -35-02-01 Ground Door Release Open Ctrl. Switches -42-01A Normal A/S Valve-Deact Assem 1 Brk Inop -42-01A Normal A/S Valve-Deact Assem 2 Brks Inop -42-01B Normal A/S Valve-Remove/Cap 1 Brk Inop -42-01B Normal A/S Valve-Remove/Cap 2 Brks Inop -42-02 A/S Wheelspeed Transducer 1 Brake Inop -42-02 A/S Wheelspeed Transducer 2 Brakes Inop -42-04A Autobrake, Solenoid Valve Closed -42-04B Autobrake, Control Module Deactivated -42-05A Autobrake, Control Module Deactivated -42-05B Autobrake, Control Module Deactivated -42-05C Autobrake, Control Module Deactivated -42-05D Autobrake, Control Module Deactivated -42-05E Autobrake, Control Module Deactivated -42-05F Autobrake, Control Module Deactivated -42-05G Autobrake, Control Module Deactivated -42-05H Autobrake, Control Module Deactivated -42-05I Autobrake, Control Module Deactivated -42-05J Autobrake, Control Module Deactivated -42-05K Autobrake, Control Module Deactivated -42-05L Autobrake, Control Module Deactivated -42-05M Autobrake, Control Module Deactivated -42-05N Autobrake, Control Module Deactivated -42-05O Autobrake, Control Module Deactivated -42-05P Autobrake, Control Module Deactivated -42-05Q Autobrake, Control Module Deactivated -42-05R Autobrake, Control Module Deactivated -42-05S Autobrake, Control Module Deactivated -42-05T Autobrake, Control Module Deactivated -42-05U Autobrake, Control Module Deactivated -42-05V Autobrake, Control Module Deactivated -42-05W Autobrake, Control Module Deactivated -42-05X Autobrake, Control Module Deactivated -42-05Y Autobrake, Control Module Deactivated -42-05Z Autobrake, Control Module Deactivated

Active Items: 32-42-01A, 32-42-02

Selected MEL
items

Active MEL items

CDL

CDL access is identical to the MEL access.

- Click on the **CDL** bezel button to access the **CDL** page.
- Select the applicable ATA chapter number via the drop down menu.

From this point onwards, CDL selection process is identical to that of MEL selection.

PERFORMANCE - CDL 1/1

MEL 777-300ER GE90-115BL

PREVIOUS

CDL Doors

COMPLETE

NEXT

CANCEL

<input type="checkbox"/>	-11-01	Passenger Door Handle Covers
<input checked="" type="checkbox"/>	-35-01	Aft Small Cargo Door Control Door
<input type="checkbox"/>	-35-02	Aft Cargo Handling Control Door
<input checked="" type="checkbox"/>	-37-01	Aft Large Cargo Door Control Door
<input type="checkbox"/>	-81-01	MLG Door Heat Shield, 1 A/C Pack
<input type="checkbox"/>	-81-01	MLG Door Heat Shield, Packs OFF
<input type="checkbox"/>	-81-01	R MLG Door Heat Shield, APU to Pack
<input type="checkbox"/>	-81-02	MLG Door Bolt Head Cover Plug

CDL

Selected CDL items

Active Items: 52-35-01, 52-37-01

Active CDL items

RUNWAY INFO

Details about a runway can be viewed via the RWY INFO bezel key button on the PERFORMANCE TAKEOFF DATA page. Clicking this button will display runway characteristics, obstacle information and modification dates for the runway selected.

This information is permanent and cannot be altered by the user. Any changes should be entered using the NOTAM page as directed by the company.

(see graphic on the next page)

The bezel keys on the right side of the AIRPORT DATA screen display the following when selected:

OK – Returns to the previous page.

ARPT COMMENT – additional airport information.

RWY COMMENT - additional runway information.

The RWY COMMENT must be reviewed when takeoff performance is being calculated.

ACTIVE NOTAMS – crew entered NOTAMS.

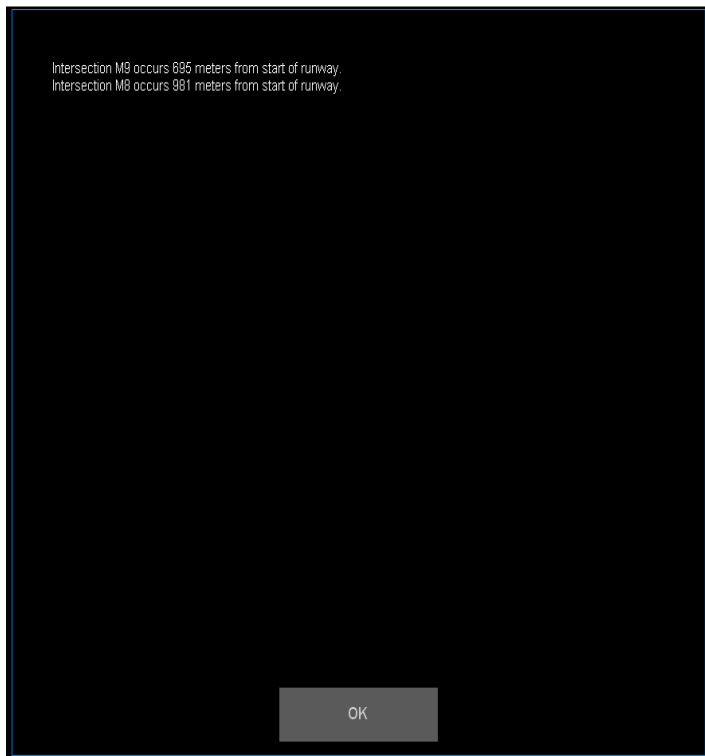
INTX – Intersection information for the current runway.

PERFORMANCE - AIRPORT DATA

RWY INFO	OMOB (Date: 11/0)		Elevation: 50 ft	OR
	Runway 12R		TORA: 4315 m TODA: 4315 m ASDA: 4570 m Slope: 0.34% LDA: 5730 m	ARRT COMMENT
NOTAMS	OBSTACLES			RWY COMMENT
	Height Above Start of Runway (ft)	Distance From Start of Runway (ft)	Offset	
	87	5065	0%	
	94	5185	0	
	115	5635	0	
	121	5730	0	ACTIVE NOTAMS
SHOW LANDING				INTX
EXIT				
This runway last updated on 20091108 Runway has 90 degree lineup turn Data includes effective NOTAMS				

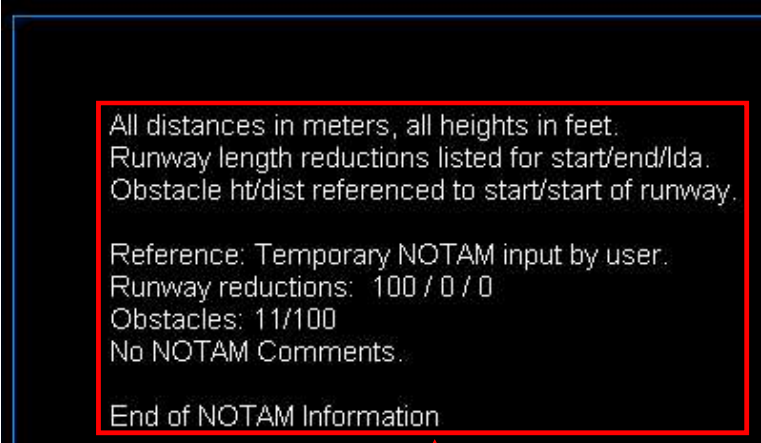
Intersection Information

Intersection characteristics, including displacement lengths, can be obtained by selecting the INTX button on the RWY INFO page. This page will show all available INTX for the selected runway. If no intersections are available for the selected runway, then the INTX button on the RWY INFO page will be disabled.



Active NOTAM Information


If a crew entered NOTAM is available, OPT will allow the user to view all affected characteristics. Crew entered NOTAMs will always be referenced with the phrase "Temporary NOTAM input by user".



All distances in meters, all heights in feet.
Runway length reductions listed for start/end/lda.
Obstacle ht/dist referenced to start/start of runway.

Reference: Temporary NOTAM input by user.
Runway reductions: 100 / 0 / 0
Obstacles: 11/100
No NOTAM Comments.

End of NOTAM Information



NOTAMs input using
the OPT interface.

LANDING MODULE

The Landing Module contains two screens; one for Dispatch and other for Enroute (Time of Landing) calculations. The following is a screen shot of the Main Page of the Landing Module (Dispatch page):

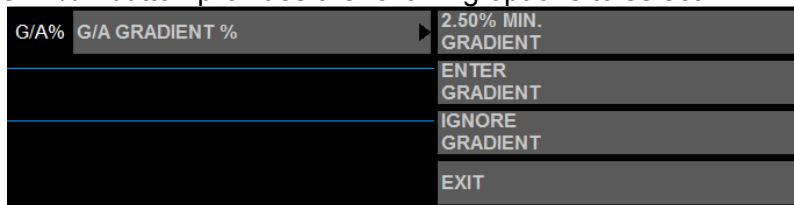
The screenshot shows a software interface titled "PERFORMANCE - LANDING - DISPATCH". On the left is a vertical sidebar with buttons: "RWY INFO", "NOTAMS", "SHOW KYBD", "SHOW TAKEOFF", and "EXIT". The main area contains several input fields and dropdown menus: "ARPT" with an "ARPT SEARCH" button, "RWY" with a dropdown menu showing "RUNWAYS", "COND" with a "RUNWAY CONDITION" dropdown, "WIND", "QAT", "QNH", and "G/A%" with a "G/A GRADIENT %" dropdown. To the right of these are four more dropdown menus: "FLAPS CONFIG" (set to "FLAPS"), "A/C CONFIG" (set to "A/C"), "A/I CONFIG" (set to "A/I"), and "SELECT" (set to "LANDING"). Below "SELECT" is a "T/R CREDIT" dropdown set to "T/R". On the far right is a vertical column of buttons: "CALC", "SHOW ENROUTE", "MEL", and "CDL".

“SHOW ENROUTE” is the toggle button between the Dispatch & Enroute page.

“SHOW DISPATCH” is the toggle button between the Enroute and Dispatch page.

Inputs:-

- Airport/Runway selection & Runway condition selection procedure is similar to the takeoff module.
- Wind, OAT, QNH entries are similar to the takeoff module
- G/A % - button provides the following options to select



The gradient should be adjusted in accordance with the instructions given in either –

Performance Dispatch (PD) – Calculation of Landing Performance at Dispatch, Climb Limit Weight

Performance In-flight (P.I.) – Calculation of Landing Performance At Time of Landing, Go-Around Performance.

The same is represented as per the following table:-

G/A % button options	Dispatch Calculations	En-route Calculations
2.50% MIN. GRADIENT	Default selection/ Cat II Approach	Default selection/ Cat II Approach
ENTER GRADIENT	If MAP G/A > 2.5%	If MAP G/A > 2.5%
IGNORE GRADIENT	Calculation to be carried out with Regulatory minimum G/A = 2.1%	<u>Not to be used</u>

(MAP: - Missed Approach Procedure)

LANDING: button provides an option to calculate Landing Performance for the Manual Landing or With Autoland.

MANUAL

AUTOLAND

EXIT

In both the Dispatch and Enroute modes, the gradient calculation is based on the aircraft being in the Approach Climb Configuration (Flaps 20, one engine inoperative).

Note: a gradient calculation is not performed if an NNC has been selected.

T/R CREDIT: (Thrust Reverser Credit) button provides an option to select the Thrust Reversers credit for the Landing Performance Calculations, the following are the options:



T/R CREDIT = ALL OPERATIVE, means Two Engine Maximum Reverse Thrust.

T/R CREDIT = ALL INOPERATIVE, means No Reversers considered for the calculation.

If Idle Thrust Reversers are used during landing, the distance shall be calculated using the “T/R CREDIT = ALL INOPERATIVE” as it will be a conservative figure in terms of the En-route landing distance (FOLD).

(Note:- T/R CREDIT = ALL INOPERATIVE may cause Wheel fuse plug cautionary message to be displayed under certain conditions. When this message is displayed crews must confirm their Brake Temperature predictions through the Brake Cool application on the EFB or the QRH to ascertain whether more than Idle Reverse is actually required).

Only for the En-route Landing Performance calculations, the RUNWAY CONDITION button will provide the options as per the FCOM TALPA ARC matrix (FCOM SP 16 Table E - Correlation of Runway Condition and Performance Basis – Enroute).

RUNWAY CONDITION



DRY

GOOD

GOOD TO MEDIUM

MEDIUM

MEDIUM TO POOR

POOR

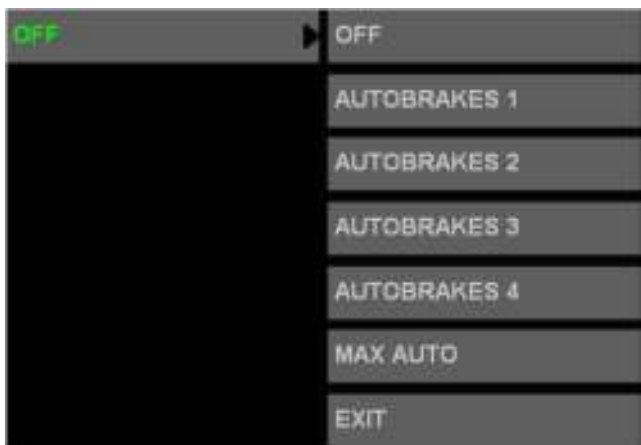
EXIT

AUTOBRAKES

Selection of Auto-brakes is only available for Enroute calculations.



(Autobrakes to OFF, means MAX MANUAL braking)



(Autobrakes dropdown list)

Calculations and Results:-

Following two output formats are offered:-

1) Dispatch Condition Calculations:-

When executing the landing module on the Dispatch page (No LANDING WT entry) the software performs the landing dispatch calculation and the limiting landing weight is presented along with the landing flaps and Vref speed. Quick Turnaround Limit (QTL) weight is also presented along with the Quick Turn Around time. *(Please note QTL is not a limitation for Dispatch)*

The output screen is presented as follows:-

PERFORMANCE - LANDING - DISPATCH

A6-EBD

ARPT	MEMB / DZBR	FLAPS 30	FLAPS	CALC
RWY	04	NO AUTO	A/C	SHOW ENROUTE
COND	WET	NO QTY	A/I	MEL
WIND	250/8 KT (5 HW/6 XW) KT	MINIMAL	LANDING	CDL
OAT	25 C (77 F)	ALL OPERATIVE	T/R	
QNH	1005.0 HPa (29.68 IN HG)			
G/A%	0.0% 0.0% (0.00/0.01)			

Dispatch Landing Data for Rwy 30L:

Max Landing Wt	251290 KG	Vref30	149 KT
Quick Turnaround Weight	292992 KG		
Quick Turnaround Time	85 minutes		

Landing Flaps: 30

2) En-route Condition Calculations:-

When "SHOW ENROUTE" is selected and when "LANDING WT" is entered, software performs the In-flight landing calculation. The Factored Operational Landing Distance (FOLD),

Vref + VREF ADD speed and the landing flaps are presented corresponding to the LANDING WT entered. VREF ADD has been defaulted to the commonly used value of 5 kts; however crews have an option to modify it.

In case of AUTOLAND, the AFM dictates a minimum Vref+5kts as the auto-throttle is considered engaged. The previous OPT Landing Module logic added 5 kts to Vref for AUTOLAND even if REF ADD already showed 5 kts (for a total Vref +10).

OPT 4.24 has been amended to remove the automatic addition of 5 kts when AUTOLAND calculation is performed. Leave the default Vref+5kts option as is for AUTOLAND calculations. If you remove the Vref addition or set any value less than 5 kts and attempt to run an AUTOLAND calculation an error message will pop up reminding you to set a minimum addition Vref ADD of 5 kts.

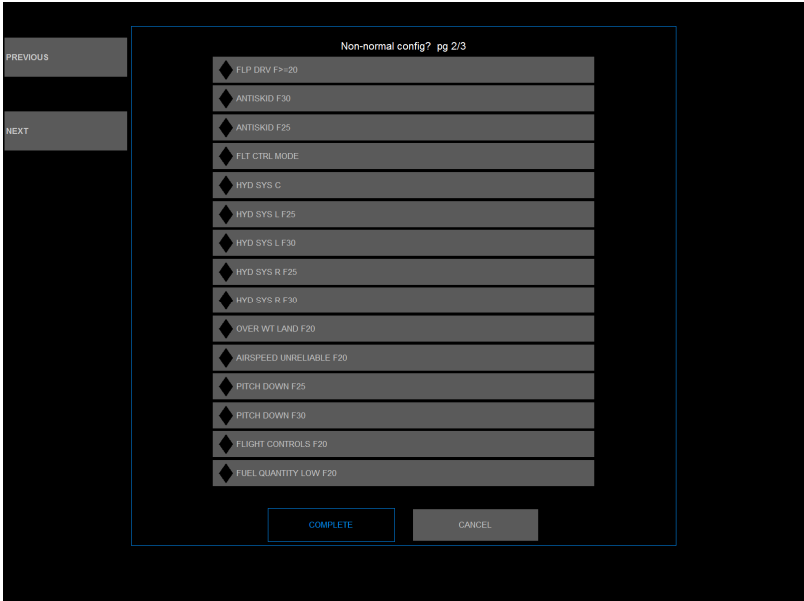


The OPT also performs the Brake Cooling calculation for the input landing weight & prevailing conditions and presents the Ground Brake Cooling Time in minutes.

The OPT actually does a first-principle based calculation of the 'Reference Brake Energy' based on the V_{td}/V_{app} speed ratio for the given model and calculated deceleration rates. After this more 'exact' calculation of the 'Reference Brake Energy', the appropriate FCOM-based adjustments are applied in determining the recommended brake cooling time.

The longer cooling time obtained via use of the FCOM/Brake Cool Application, relative to the OPT is due to some additional conservatism in the portion of the FCOM charts that determine the 'Reference Brake Energy'.

“For En-route calculations without NNC (Non-normal Configuration), ensure NNC button is selected to NONE as follows:”



Ensure all the other fields are initialized as appropriate; only then **CALC** button will be enabled for the calculation.

The out screen is presented as follows:-

Output format for Enroute Calculation

PERFORMANCE - LANDING - ENROUTE

A6-EBD

ARPT	BRNO / GAB	FLAPS 30	FLAPS
RWY	04	A/C INFO	A/C
COND	WIND	A/D OFF	A/D
WRND	250/8 KT (5 HW/6 XW) KT	AUTOLAND	LANDING
OAT	25 C (77 F)	ALL OPERATIVE	T/R
QNH	1005.0 HPa (29.68 IN HG)	AUTOBRAKES 4	AUTOBRKS
G/A%	GRABENT	WIND	NNC

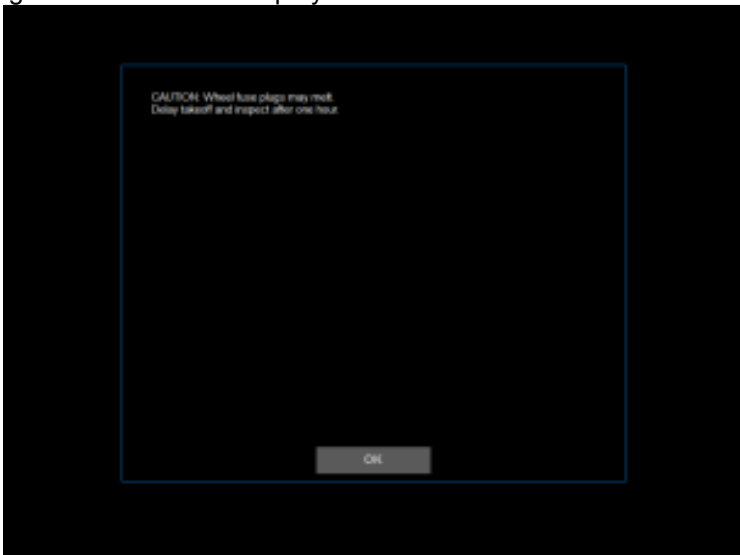
LANDING WT: 250000 KG VREF ADD: 5

Brake Cooling Time Data
Ground Brake Cooling Time : 37 minutes

Enroute Landing Data for 250000 KG:
FOLD : 2606 M
Vref30+5: 154 KT
Landing Flaps: 30

Left sidebar: RWY INFO, NOTAMS, SHOW KYBD, SHOW TAKEOFF, EXIT
Right sidebar: CALC, SHOW DISPATCH, MEL, CDL, SHOW GRAPHIC

During landing, in case the energy built-up in the brakes exceeds the normal limits and enters into the FUSE PLUG melt zone, the following CAUTION will be displayed:



For this case the results screen will not provide the Brake Cooling Time Data. The following screen-shot provides input & output details:

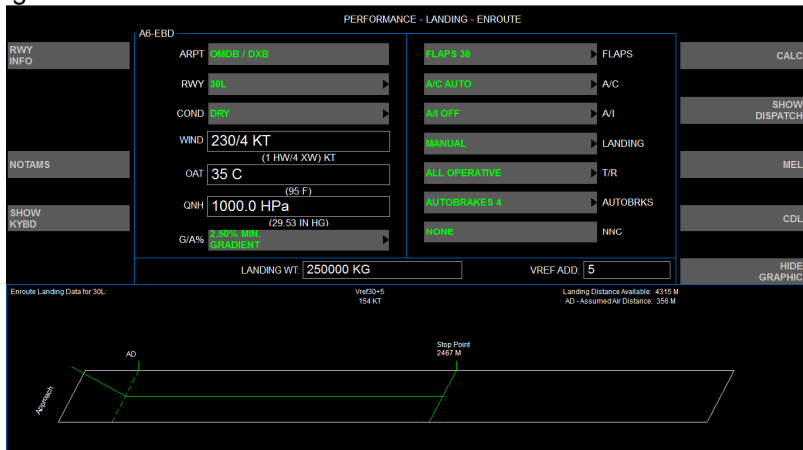
PERFORMANCE - LANDING - ENROUTE

RWY INFO	ARPT	ORNDL / ORNDL	FLAPS 30	FLAPS	CALC
	RWY	04L	A/C AUTO	A/C	
	COND	030V	A/I OFF	A/I	SHOW DISPATCH
	WIND	230/4 KT (4 TW/1 XW) KT	AUTO LAND	LANDING	
	OAT	21 C (70 F)	ALL OPERATIVE	T/R	MEL
	QNH	1000.0 HPa (29.53 IN HG)	MAX AUTO	AUTOBRKS	CDL
	G/A%	0.00% WIND STANDARD	NONE	NNC	
	LANDING WT: 251000 KG		VREF ADD: 5		SHOW GRAPHIC
	Brake Cooling Time Data				
	Ground Brake Cooling Time : N / A				

Enroute Landing Data for 251000 KG:

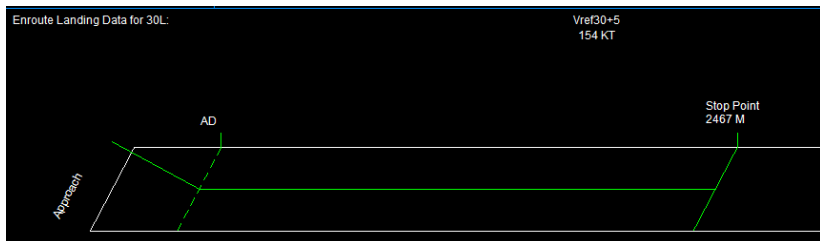
FOLD:	2583 M
Vref30+5:	155 KT
Landing Flaps:	30

“SHOW GRAPHIC” button presents a graphical presentation of Landing Results



The OPT graphical presentation introduced in OPT 4.24 is advisory only and partly replicates FOLD assumptions (Factored Operational Landing Distance).

AD – “Assumed Air Distance” displayed is equivalent to minimum flare as per the flight test criteria and does not reflect any additional OLD/FOLD margin for flare. Conversely, the “Stop Point” displayed is based on FOLD assumptions (margin for flare plus the 15% additional distance).



MEL/CDL

MEL/CDL functions work similar to the Takeoff Module.

NOTAMS

Reduction in the Landing Distance Available (LDA) can be made using the NOTAMS button similar to the Takeoff Module. Whenever NOTAMS entry is carried out amber colour band is shown, indicating the user entered NOTAM is active.

NOTAMS

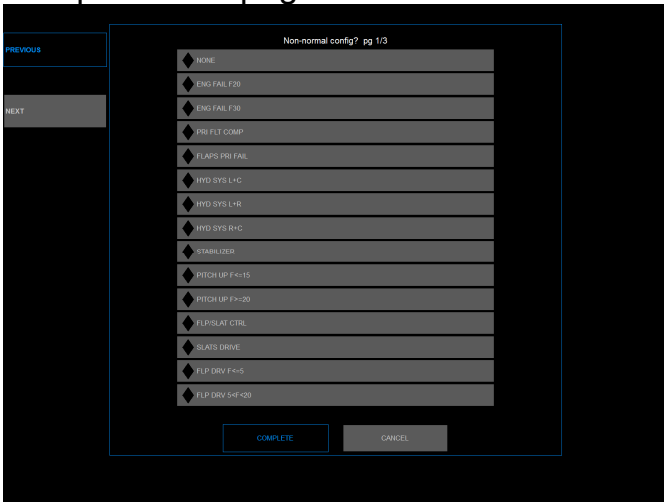
NNC

In the Enroute mode, the selection of a Non-normal Configuration (NNC) can be made using the NNC button. The selected NNC will be displayed on the button.

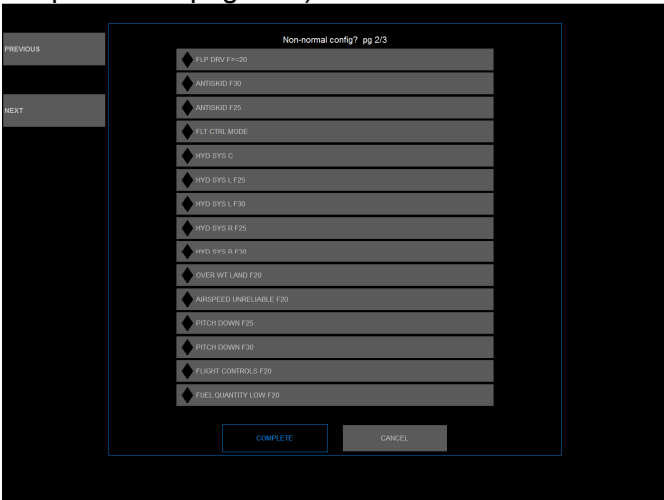


The display of NNC items can be switched between multiple screens using the NEXT and PREVIOUS buttons

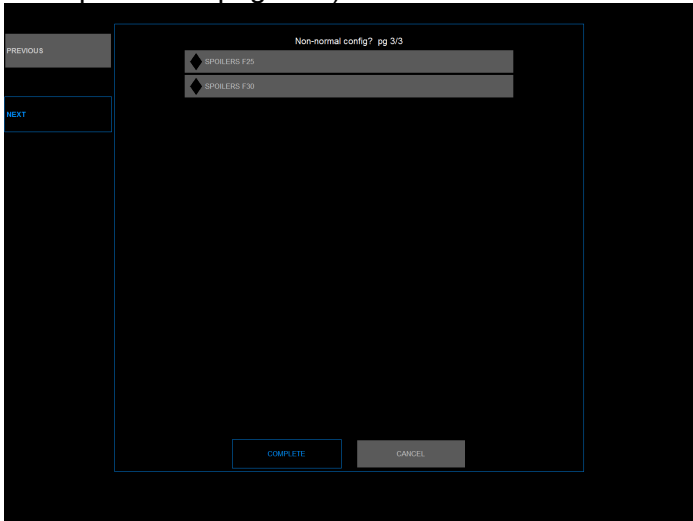
NNC dropdown list page 1/3



(NNC dropdown list page 2/3)



(NNC dropdown list page 3/3)



NNC Calculation Limitations

Multiple system failures can't be selected in the landing module. In such scenario, Boeing recommends to assess the each failure individually and select the most conservative landing distance.

The output screen-shot with the sample NNC calculation:

The screenshot displays the A6-EBD PERFORMANCE - LANDING - ENROUTE interface. The left sidebar contains menu items: RWY INFO, NOTAMS, SHOW KYBD, SHOW TAKEOFF, and EXIT. The main area is divided into several sections:

- Inputs:** ARPT (MADRID), RWY (08L), COND (NORMAL), WIND (230/4 KT), OAT (21 C), QNH (1000.0 HPa), G/A% (empty), LANDING WT (250000 KG), and VREF ADD (5).
- Configuration:** A vertical list of dropdown menus for FLAPS, A/C, A/I, LANDING, T/R, and AUTOBRKS. The AUTOBRKS dropdown is currently set to 'NNC'.
- Results:** A section titled 'Enroute Landing Data for 250000 KG:' showing:
 - FOLD: 4085 M
 - NNC SPD+5: 174 KT
 - Landing Flaps: 20

Note: The landing module does not carry out the Go-around gradient & Brake Cooling time calculations, if an NNC has been selected.

The Autobrake selection is feasible provided the non-normal configuration (En-route failure) allows the use of the Autobrakes during the landing. The following screen-shot provides an example:

A6-EBD

- RWY INFO
- NOTAMS
- SHOW KYBD
- SHOW TAKEOFF
- EXIT

ARPT **FAON / JNB**

RWY **04**

COND **WET**

WIND **230/4 KT**
(4 TW/1 XW) KT

OAT **21 C**
(70 F)

QNH **1000.0 HPa**
(29.53 IN HG)

G/A%

FLAPS

A/C

A/I

LANDING

T/R

SHOW AUTOBRK AUTOBRKS

SHOW WIND WIND

NNC

- CALC
- SHOW DISPATCH
- MEL
- CDL
- SHOW GRAPHIC

LANDING WT: **250000 KG** VREF ADD: **5**

Enroute Landing Data for 250000 KG:

FOLD :	2554 M
NNC SPD+5:	174 KT
Landing Flaps:	20

Known Limitations Landing En-route Calculations

For runway condition “DRY”, calculation for Autobrake selection “OFF” (Max Manual Braking) is not feasible due to performance database limitations.

A6-EBD	
ARPT: FAOR / JNB	FLAPS 30 ▶ FLAPS
RWY: 03L ▶	A/C AUTO ▶ A/C
COND: DRY ▶	A/I OFF ▶ A/I
WIND: 230/4 KT (4 TW/1 XW) KT	AUTOLAND ▶ LANDING
OAT: 21 C (70 F)	ALL OPERATIVE ▶ T/R
QNH: 1000.0 HPa (29.53 IN HG)	OFF ▶ AUTOBRKS
G/A%: 2.50% MIN GRADIENT ▶	NONE ▶ NNC
LANDING WT: 250000 KG	VREF ADD: 5

If such calculation is attempted the following error message will be displayed.



Under certain MEL conditions, it is not authorized to use AUTOBRAKES for landing. In such cases if runway condition is DRY, no landing distance calculation is feasible using OPT. However the work-around is to select runway condition = “GOOD” & AUTOBRAKES = OFF and calculate landing performance. The results obtained would be conservative in terms of landing distance.

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