NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

June 1, 2020

Group Chairmen's Factual Report – Attachment 10

PenAir Airport Analysis Manual excerpt

OPERATIONAL FACTORS/HUMAN PERFORMANCE

DCA20MA002

*** APPROACH CLIMB LIMITS - APPROACH FLAPS 20 ***
CLIMB PERFORMANCE NOT LIMITING BELOW 46 (C)

TEMP(C)	-20	0	20	30	35	40	45	46
CLMB WT	48500.	48500.	48500.	48500.	48500.	48500.	48500.	48500.

CORRECTIONS: ANTIICE ON SUBTRACT 0 POUNDS ABOVE -20. DEGREES C
ANTIICE ON + ACCUM ICE SUB 7305 POUNDS ABOVE 45. DEGREES C

*** LANDING FIELD LENGTH LIMITS ***

RUNWAY LENGTH SLOPE	WIND KTS	** LANDING FLAPS 20 ** DESTINATION DRY	DESTINATION 115%-WET	ALTERNATE DRY	ALTERNATE 115%-WET	** LANDING FLAPS 35 ** DESTINATION DRY	DESTINATION 115%-WET	ALTERNATE DRY	ALTERNATE 115%-WET
	-15	NA	NA	30760	NA	NA	NA	34783	NA
	-10	NA	NA	34916	28788	31955	NA	40078	32593
	-5	32932	NA	40687	33577	37712	30925	47150	38488
13									
3900FT	0	37776	31410	46653	38560	43819	35946	48500	44730
-0.22									
	10	40446	33690	48500	41236	47014	38760	48500	47943
	20	43345	36038	48500	44203	48500	41896	48500	48500
CRT	TW	0	0	0	0	0	0	-4	0
SUB	LB/KT	-960	-842	-1059	-977	-1111	-1009	-1246	-1113
	-15	NA	NA	30760	NA	NA	NA	34783	NA
	-10	NA	NA	34916	28788	31955	NA	40078	32593
	-5	32932	NA	40687	33577	37712	30925	47150	38488
31									
3900FT	0	37776	31410	46653	38560	43819	35946	48500	44730
0.21									
	10	40446	33690	48500	41236	47014	38760	48500	47943
	20	43345	36038	48500	44203	48500	41896	48500	48500
CRT	TW	0	0	0	0	0	0	-4	0
SUB	LB/KT	-960	-842	-1059	-977	-1111	-1009	-1246	-1113

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CORRECTIONS: ANTIICE ON SUBTRACT 0 POUNDS ABOVE -20. DEGREES C
ANTIICE ON + ACCUM ICE SUB 7305 POUNDS ABOVE 45. DEGREES C

RUNWAY	** LANDING FLAPS 20 **				** LANDING FLAPS 35 **			
LENGTH WIND	- ALT CG I -		- ALT CG II -		- ALT CG I -		- ALT CG II -	
SLOPE KTS	DRY	115%-WET	DRY	115%-WET	DRY	115%-WET	DRY	115%-WET
-15	NA	NA	NA	NA	NA	NA	29510	NA
-10	29080	NA	29955	NA	33408	NA	34292	NA
-5	34438	NA	35402	28988	39319	32243	40203	32916
13								
3900FT 0	39529	33058	40628	33507	45233	37472	46114	38354
-0.22								
10	42159	35191	43060	36280	48384	40449	48500	41333
20	45153	37721	45812	38821	48500	43231	48500	43967
CRT TW	0	0	0	0	0	0	0	0
SUB LB/KT	-1044	-1038	-1031	-903	-1117	-1078	-1106	-1120
-15	NA	NA	NA	NA	NA	NA	29510	NA
-10	29080	NA	29955	NA	33408	NA	34292	NA
-5	34438	NA	35402	28988	39319	32243	40203	32916
31								
3900FT 0	39529	33058	40628	33507	45233	37472	46114	38354
0.21								
10	42159	35191	43060	36280	48384	40449	48500	41333
20	45153	37721	45812	38821	48500	43231	48500	43967
CRT TW	0	0	0	0	0	0	0	0
SUB LB/KT	-1044	-1038	-1031	-903	-1117	-1078	-1106	-1120

*** APPROACH CLIMB LIMITS - APPROACH FLAPS 20 ***
CLIMB PERFORMANCE NOT LIMITING BELOW 46 (C)

TEMP(C)	-20	0	20	30	35	40	45	46
CLMB WT	48500.	48500.	48500.	48500.	48500.	48500.	48500.	48500.

CORRECTIONS: ANTIICE ON SUBTRACT 0 POUNDS ABOVE -20. DEGREES C
ANTIICE ON + ACCUM ICE SUB 7305 POUNDS ABOVE 45. DEGREES C

*** LANDING FIELD LENGTH LIMITS ***

*** INCREASED REF. SPEED (VREF-ICE) ***

RUNWAY LENGTH SLOPE	WIND KTS	** LANDING FLAPS 20 ** DESTINATION DRY	DESTINATION 115%-WET	ALTERNATE DRY	ALTERNATE 115%-WET	** LANDING FLAPS 35 ** DESTINATION DRY	DESTINATION 115%-WET	ALTERNATE DRY	ALTERNATE 115%-WET
	-15	NA	NA	NA	NA	NA	NA	NA	NA
	-10	NA	NA	NA	NA	NA	NA	31805	NA
	-5	NA	NA	30731	NA	29670	NA	36291	30229
13									
3900FT	0	NA	NA	34453	28826	33553	NA	41189	34186
-0.22									
	10	30424	NA	36813	30979	36013	30190	44173	36671
	20	32557	NA	39229	33132	38582	32314	47138	39339
CRT	TW	20	20	20	20	20	20	20	20
SUB	LB/KT	NA	NA	-744	0	-776	NA	-979	-791
	-15	NA	NA	NA	NA	NA	NA	NA	NA
	-10	NA	NA	NA	NA	NA	NA	31805	NA
	-5	NA	NA	30731	NA	29670	NA	36291	30229
31									
3900FT	0	NA	NA	34453	28826	33553	NA	41189	34186
0.21									
	10	30424	NA	36813	30979	36013	30190	44173	36671
	20	32557	NA	39229	33132	38582	32314	47138	39339
CRT	TW	20	20	20	20	20	20	20	20
SUB	LB/KT	NA	NA	-744	0	-776	NA	-979	-791

LANDING PERFORMANCE CHART
DESCRIPTION / DEFINITIONS
SF-2000 AE 2100A

1. Chart Heading

The chart heading specifies the performance outlined (takeoff or landing), the airport by Identifier, City/State, and Airport Name, the airport elevation, and the Aircraft type and Engine.

2. Approach Climb Limits

The approach climb limit weights meet the minimum climb gradients required for the approach climb (go-around) phase of landing as defined in the certification regulations. The approach climb limit weights are determined from the applicable Landing Weight Permitted by Climb Requirements Charts within the AFM. The approach climb limit is dependent upon reported surface temperature and airport altitude only. Corrections are displayed for Anti-ice ON.

3. Aircraft/Runway Configuration for Landing

Landing data is provided for the following aircraft/runway configurations:

Landing Flaps 20 and 35 degrees
Landing Distance factors of Destination and Alternate
Dry and Wet runways

4. Runway Identifier

The runway identifier is specified as follows:

- Full length runways indicated by basic identifier i.e. 34L
- Temporary runway lengths / closures include “TMP”, i.e. 34LTMP

Declared Distances used:

- Landing Distance Available (LDA)

Associated effective runway slope/gradient.

5. Landing Runway Limit Weight

The runway limit weight for landing distance available is displayed corresponding to given wind component and aircraft/runway configuration.

THE LIMITING LANDING WEIGHT IS THE LOWER OF THE RUNWAY LIMIT WEIGHT, THE APPROACH CLIMB LIMIT WEIGHT, OR THE MAXIMUM CERTIFIED STRUCTURAL LIMIT WEIGHT.

6. Critical Tailwind / Tailwind Penalty

The critical tailwind is the maximum tailwind component at which maximum structural landing weight may be achieved. At all greater tailwind components (to a maximum of –10 knots) the

allowable landing weight must be reduced. If the tailwind component exceeds the critical tailwind, multiply the associated tailwind value by the number of knots of tailwind in excess of the critical tailwind. Subtract the resulting penalty weight from the zero wind landing limit weight.

> Example: If the critical tailwind is 6 knots and there is a 10-knot tailwind, a downwind landing would require a weight penalty calculated as follows:
> You must take the difference of 4 knots (10 knots – 6 knots) and multiply it by the penalty figure given (SUB LB/KT or SUB KG/KT). The resulting weight should then be subtracted from the maximum zero wind weight. The reduction in landing weight will then allow you to land with the 10-knot tailwind component.

7. Date

Indicates the date the performance chart was prepared.

-- OFF - KOFF --
ELEVATION 1049

LANDING PERFORMANCE
SF-2000
AE 2100A ENG

-- OFF - KOFF --
OMAHA, NE
OFFUTT

1

*** APPROACH CLIMB LIMITS - APPROACH FLAPS 20 ***
CLIMB PERFORMANCE NOT LIMITING BELOW 46 (C)

TEMP(C)	-20	0	20	30	35	40	45	46
CLMB WT	48500.	48500.	48500.	48500.	48500.	48500.	48500.	48500.

2

CORRECTIONS: ANTIICE ON SUBTRACT 0 POUNDS ABOVE -20. DEGREES C
ANTIICE ON + ACCUM ICE SUB 7300 POUNDS ABOVE 40. DEGREES C

*** LANDING FIELD LENGTH LIMITS ***

4

3

RUNWAY LENGTH SLOPE	WIND KTS	** LANDING FLAPS 20 ** DESTINATION DRY	DESTINATION 115%-WET	ALTERNATE DRY	ALTERNATE 115%-WET	** LANDING FLAPS 35 ** DESTINATION DRY	DESTINATION 115%-WET	ALTERNATE DRY	ALTERNATE 115%-WET
12 10695FT -0.66	-10	48500	48500	48500	48500	48500	48500	48500	48500
	-5	48500	48500	48500	48500	48500	48500	48500	48500
	0	48500	48500	48500	48500	48500	48500	48500	48500
	10	48500	48500	48500	48500	48500	48500	48500	48500
	20	48500	48500	48500	48500	48500	48500	48500	48500
6 CRT	TW	-10	-10	-10	-10	-10	-10	-10	-10
SUB	LB/KT	0	0	0	0	0	0	0	0
30 10612FT 0.66	-10	48500	48500	48500	48500	48500	48500	48500	48500
	-5	48500	48500	48500	48500	48500	48500	48500	48500
	0	48500	48500	48500	48500	48500	48500	48500	48500
	10	48500	48500	48500	48500	48500	48500	48500	48500
	20	48500	48500	48500	48500	48500	48500	48500	48500
CRT	TW	-10	-10	-10	-10	-10	-10	-10	-10
SUB	LB/KT	0	0	0	0	0	0	0	0