NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

June 1, 2020

Group Chairmen's Factual Report – Attachment 11

PenAir Saab 2000 Aircraft Performance presentation excerpt

OPERATIONAL FACTORS/HUMAN PERFORMANCE

DCA20MA002

SAAB 2000

AIRCRAFT PERFORMANCE

PenAir
THE SPIRIT OF ALASKA

Rev 01 11/08/15

Airport Analysis

Airport Analysis Manual

Calculating takeoff and landing performance data for all airports within the PenAir route structure. These Manuals are located in each a/c.

Aircraft Performance Group (APG)

Provides the performance data and is designed to meet FAA requirements.

Outside the PenAir normal route structure, dispatch will provide flight crews airport analysis data with normal flight paperwork.

APG Takeoff Performance Charts Description, Definitions and Instructions

PenAir
THE SPIRIT OF ALASKA

SF-2000
AE 2100A
INTRODUCTION

Runway Analysis provides the means to determine maximum allowable takeoff and landing weights based upon:

Airport characteristics consisting of airport elevation, runway gradient and length, runway contaminants, and the obstructions within the takeoff flight path,

Environmental conditions consisting of temperature, wind, and pressure altitude.

Aircraft Configurations consisting of power settings, flap settings, bleed configurations, and Minimum Equipment List (MEL) inoperative components.

The performance and limitations are as outlined in the approved Airplane Flight Manual (AFM) for the specific aircraft considered. All takeoff and landing airport analysis data provided by Aircraft Performance Group complies with FAA regulations.

TAKEOFF

The maximum allowable takeoff weight is obtained by selecting the most limiting of the following:

1. Maximum certified takeoff structural weight.

2. Climb limited weight – the maximum weight at which the appropriate airworthiness climb gradients, for each takeoff segment, are attained for airport elevation and temperature.

3. Runway field length limit weight – the maximum weight at which the aircraft complies with the appropriate airworthiness rules governing runway length, runway gradient (slope), airport elevation, temperature, wind, pressure altitude, and runway contamination.

4. Obstruction limited weight – the maximum weight at which obstruction clearance required by the appropriate airworthiness rules can be attained. The obstruction limit weight is a function of aircraft configuration, obstacle height and distance, airport elevation, temperature, and wind. Unless otherwise stated, all takeoffs assume a straight out takeoff flight path along the extended runway centerline.

5. Brake energy – the maximum weight at which the aircraft brakes can absorb the amount of energy required to stop the aircraft.

6. Tire speed – the maximum weight so as not to exceed the maximum tire speed limitations.

NOTE: Some runways/airports require a "Special Departure Procedure" in order to optimize takeoff weight in terrain sensitive areas. The specific description of the Special Departure Procedure is outlined on a separate page attached to the takeoff airport analysis. These procedures describe the non-standard, one engine inoperative departure flight path. The maximum allowable takeoff weights, presented in the subsequent analysis, are based upon following the specific procedure(s) outlined.

LANDING

The maximum allowable landing weight is obtained by selecting the most limiting of the following:

1. Maximum certified landing structural weight.

2. Climb limited weight – the maximum weight at which the appropriate airworthiness climb gradients, in the approach and landing configuration, are attained for airport elevation and temperature.

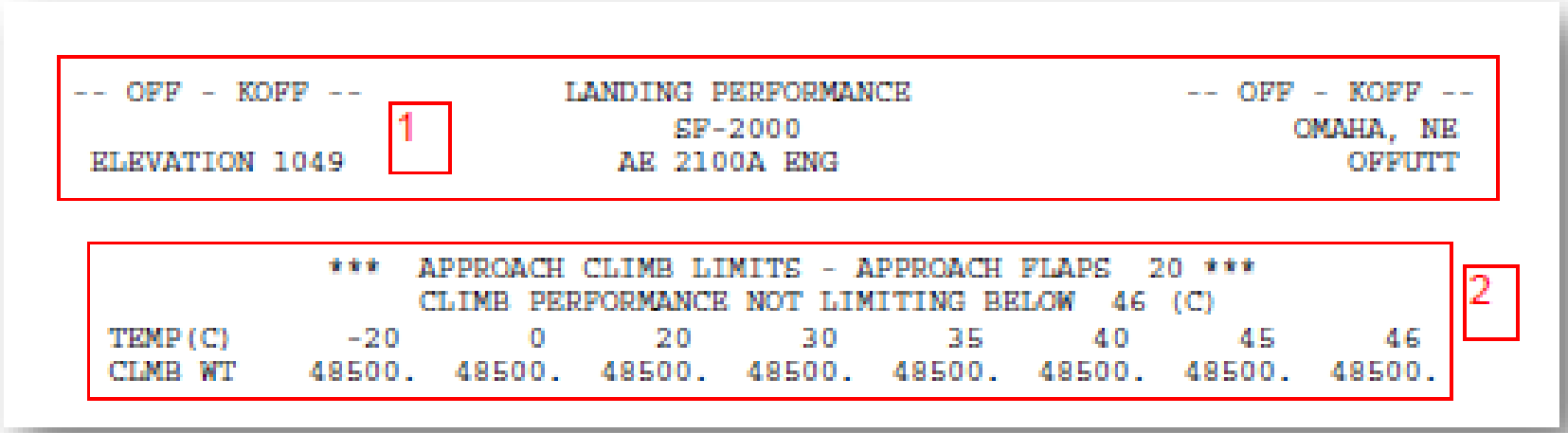
3. Runway field length limit weight – the maximum weight at which the aircraft complies with the appropriate airworthiness rules governing runway length, runway gradient (slope), airport elevation, wind, pressure altitude, and runway contamination.

Landing Performance Chart Description, Definitions and Instructions

PenAir
THE SPIRIT OF ALASKA

DISTINCTION THROUGH SAFETY

Airport Analysis Landing Chart



```
-- OFF - KOFF --                LANDING PERFORMANCE                -- OFF - KOFF --
                                     SF-2000                          OMAHA, NE
 ELEVATION 1049                   AE 2100A ENG                         OFFUTT

                *** 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.
```

1

2

1. Chart Heading

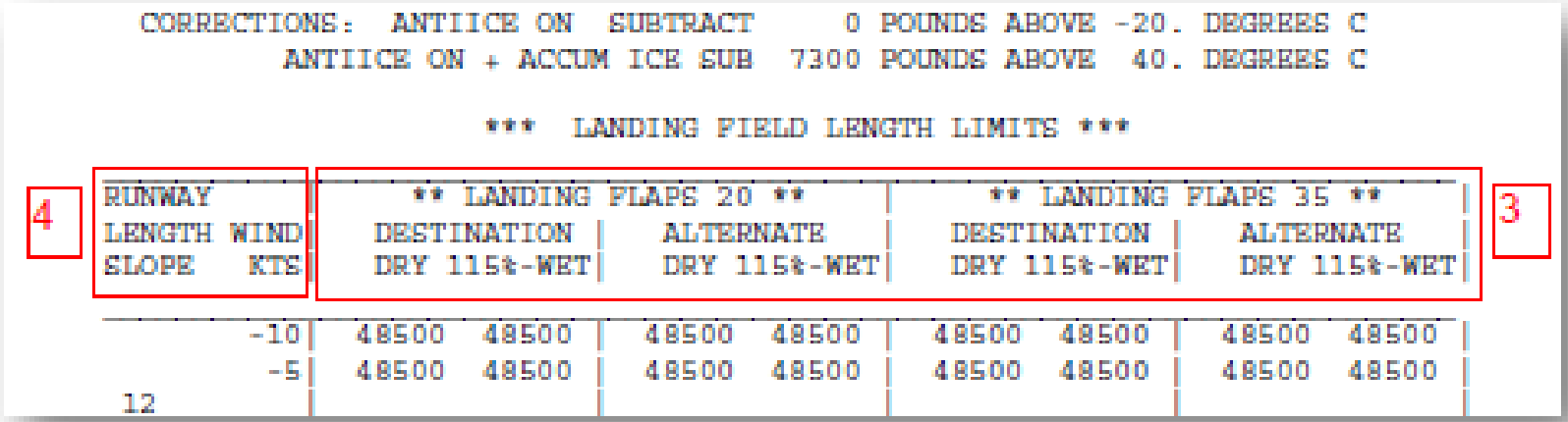
The chart heading specifies the performance outlined (takeoff or landing), the airport by Identifier, City/State, and Airport Name, the airport elevation, and the Aircraft type and Engine.

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.

PenAir
THE SPIRIT OF ALASKA

Airport Analysis Landing Chart



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 ***

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
	-10	48500	48500	48500	48500	48500	48500	48500	48500
	-5	48500	48500	48500	48500	48500	48500	48500	48500
12									

4

3

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.

PenAir
THE SPIRIT OF ALASKA

Airport Analysis Landing Chart

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.

12								
10695FT	0	48500	48500	48500	48500	48500	48500	48500	48500
-0.66								
	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

6

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.

PenAir
THE SPIRIT OF ALASKA

7. Date

Indicates the date the performance chart was prepared.

Airport Analysis Landing Chart

-- AKN - PAKN -- LANDING PERFORMANCE -- AKN - PAKN --
SF-2000 KING SALMON, AK
ELEVATION 73 AE 2100A ENG KING SALMON

*** 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 7293 POUNDS ABOVE 45. DEGREES C

*** LANDING FIELD LENGTH LIMITS ***

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

RUNWAY		** LANDING FLAPS 20 **				** LANDING FLAPS 35 **			
LENGTH	WIND	DESTINATION		ALTERNATE		DESTINATION		ALTERNATE	
SLOPE	KTS	DRY	115%-WET	DRY	115%-WET	DRY	115%-WET	DRY	115%-WET
	-10	48500	48500	48500	48500	48500	48500	48500	48500
	-5	48500	48500	48500	48500	48500	48500	48500	48500
12									
8501FT	0	48500	48500	48500	48500	48500	48500	48500	48500
0.15									
	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
	-10	48500	48500	48500	48500	48500	48500	48500	48500
	-5	48500	48500	48500	48500	48500	48500	48500	48500
30									
8501FT	0	48500	48500	48500	48500	48500	48500	48500	48500
-0.15									
	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

FAA AFM CODE 001 19Apr16

PenAir
THE SPIRIT OF ALASKA

ALT CG I or II landing weights

RUNWAY LENGTH SLOPE	WIND KTS	** LANDING FLAPS 20 ** - ALT CG I - DRY	115%-WET	- ALT CG II - DRY	115%-WET	** LANDING FLAPS 35 ** - ALT CG I - DRY	115%-WET	- ALT CG II - DRY	115%-WET
	-10	31610	NA	32217	NA	35963	28870	36698	29494
	-5	36843	30094	37943	30828	42203	34784	42940	35490
13									
4099FT	0	42204	35056	43099	36122	48438	40260	48500	41144
0.13									
	10	44991	37592	45728	38692	48500	43101	48500	43838
	20	48147	40319	48500	41417	48500	46185	48500	47059
CRT	TW	0	0	0	0	0	0	0	0
SUB	LB/KT	-1059	-991	-1088	-998	-1247	-1139	-1180	-1164
	-10	NA	NA	NA	NA	NA	NA	NA	NA
	-5	29286	NA	30133	NA	33823	NA	34547	NA

PenAir
THE SPIRIT OF ALASKA