NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

PenAir Maintenance Factual Report

NTSB No: DCA20MA002

November 23, 2020

A. ACCIDENT:

Operator:	Peninsula Aviation Services Incorporated (PenAir)
Location:	Unalaska, AK
Date:	October 17, 2019
Time:	1740 Alaska Daylight Time
Aircraft:	SAAB SB20 (S/N:2000-017), Registration N686PA, Flight 3296

B. GROUP

Group Chairman:	Pocholo Cruz National Transportation Safety Board Washington, D.C.
Member:	Nick Aderman PenAir Anchorage, AK

C. SUMMARY

On October 17, 2019, about 1740 Alaska daylight time, PenAir flight 3296,[1] a SAAB 2000, N686PA, overran the runway while landing at the Thomas Madsen Airport (DUT), Unalaska, Alaska. The airplane was making its second landing approach when it touched down on runway 13 and overran the runway passing through the airport perimeter fence, crossing a road, and then pitching down over shoreline rocks. The airplane came to rest with the main landing gear wheels at the top of the rocks and the nose wheel in the water. Of the 39 passengers and 3 flight crew on board, 1 passenger was fatally injured, 4 passengers sustained injuries, and 37 passengers and flight crew were uninjured. Visual meteorological conditions prevailed. The airplane was substantially damaged. The airplane was operating as a regularly scheduled passenger flight in

[1] The airplane was owned and operated by Peninsula Aviation Services Incorporated d.b.a. PenAir.

accordance with the provisions of *14 Code of Federal Regulations Part 121* from Ted Stevens International Airport (ANC), Anchorage, Alaska to DUT.

D. DETAILS OF INVESTIGATION

1.0 Air Carrier Certificates

Peninsula Aviation Services Incorporated d.b.a. PenAir located at 6100 Boeing Avenue, Anchorage, AK 99502. A Part 121 operations certificate number, PNSA044A, was originally issued to PenAir by the Federal Aviation Administration's (FAA) Certificate Management Office- Alaska Region, on July 31, 1979 and reissued on June 1, 2010.

2.0 Operations Specifications (OpSpecs)[1]

PenAir Certificate, which includes the standards, terms, conditions, and limitations contained in the FAA approved Operations Specifications were reviewed:

(a) Air carrier was authorized as a 14 CFR Part 121 operation.

(b) Section D072 (Continuous Airworthiness Maintenance Program or CAMP) of the OpSpecs authorized PenAir to maintain in accordance with the conditions and limitations specified in each of the approved ops specs. Each aircraft and its component parts, accessories, and appliances are maintained in an airworthy condition in accordance with time limits for the accomplishment of the overhaul, replacement, periodic inspection, and routine checks of the aircraft and its component parts accessories and appliances. For the SAAB 2000-2000 aircraft, the authorized CAMP can be found in PenAir Continuous Airworthiness Maintenance Program Manual #56.

(c) Section D084 of the OpSpecs authorized PenAir to conduct ferry flights using a special flight permit with continuous authorization in accordance with the limitations and provisions of the specification. The approved ferry flight program can be found in PenAir General Maintenance Manual 51.16.

(d) Section D085 of the OpSpecs, PenAir has six[2] SAAB 2000-2000 aircraft in the fleet.

(e) Section D089 of the OpSpecs, authorized PenAir to use the Time Limitations specified in the SAAB-2000-2000 CAMP 56.4, dated January 20, 2016.

(f) Section D091 of the OpSpecs authorized PenAir to make arrangements with other maintenance providers to accomplish maintenance, preventive maintenance, or alterations for the certificate holder. The PenAir authorizing document is in CASS Manual #52, Chapter 52.7.

(g) Section D092 of the OpSpecs authorized PenAir for Operations in Designated Reduced Vertical Separation Minimum (RVSM) which included aircraft N686PA.

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[1] Operations Specifications contains the authorizations, limitations, and certain procedures under which each kind of operation, if applicable, is to be conducted by the certificate holder.
[2] Includes aircraft N686PA.

(h) Section D095 of the OpSpecs authorized PenAir to use an FAA approved Minimum Equipment List (MEL) for the SAAB-2000-2000 aircraft.

(i) Section D097 of the OpSpecs authorized the PenAir Aging Aircraft Program per GMM 51.22.11 Rev 11 dated March 17, 2018 for supplemental inspections, electrical wiring interconnection systems (EWIS) and fuel tank system maintenance. Flammability Reduction was not applicable per FAA Transport Directorate letter dated June 17, 2009, SAAB document ID 016345 issue A dated February 10, 2009. Repair Assessment for Pressurized Fuselages was not applicable per Regulation.

(j) Per section E096 of the OpSpecs, PenAir is authorized for a Weight and Balance Control Program. PenAir is authorized to use individual aircraft weights outlined in the PenAir in GMM 51.22.9. Each SAAB 2000-2000 aircraft was weighed at a 36 months interval.

3.0 Type Certificate Data Sheet

The Type Certificate Data Sheet (A47NM) prescribes conditions and limitations under which the product for which the Type Certificate (TC) was issued meets the airworthiness requirements of the Federal Aviation Regulations. According to the document, SAAB Aircraft AB is the holder of the TC.

4.0 Aircraft Information

The SAAB Company manufactured the SAAB 2000, serial number 2000-017 airplane on June 9, 1995. Airplane was owned by several operators prior to PenAir. The airplane was then leased from Jet Stream Leasing by PenAir in 2016 but was not put on the PenAir OpSpecs until June 2019. The airplane had accumulated 12,617.0 total flight hours with 9,455 total flight cycles at the time of the accident on October 17, 2019.

The airplane was equipped with two Rolls Royce turbine turboprop engines and a Hamilton Sundstrand Auxiliary Power Unit (APU). The engines and APU had accumulated the following operating times at the time of the accident:

Engine and APU Information

	No.1 Engine	**No.2 Engine**	**APU**
Manufacturer	Rolls Royce	Rolls Royce	Hamilton Sundstrand
Model	AE2100A	AE2100A	T-62T-46C7 (APS 1000)
Manufacture Date (Installed New Date)	9/28/2016 1/25/1997	2/19/1997 3/6/1997	4/28/1995 8/9/1995
Date Installed	8/24/2019	1/31/2019	1/30/2019
Serial Number	CAE-510098	CAE-510109	SP-E951236
Time Since Shop Visit (Engine /APU hours)	319.0	655.7	1,356.89
Total Cycles Since Shop Visit (Engine/APU cycles)	250	524	2,751
Engine/APU Total Time Hours	19,271.0	26,214.8	10,520.7
Engine/APU Total Cycles	20,813	30,152	12,828

Location of Engine/APU Installation	ANC	ANC	ANC
Total Time of Airframe at engine/APU installation (hours)	12,298.0	11,961.3	11,961.3
Total Cycles of Airframe at engine/APU installation	9,207	8,933	8,933

Propeller Information

The airplane was also equipped with two six bladed Dowty R381/6-123-F/5 propellers and had accumulated the following operating times at the time of the accident:

		No.1 Propeller	No.2 Propeller
Manufacture Date		4/27/1995	7/8/1995
Date Installed		8/26/2019	9/21/2019
Serial Number		DAP0047	DAP0062
Total Time (hours)		19,512.6	35,819.5
Time Since Overhaul (hours)		317.6	6,041.9
Hours since last installation (hours)		317.6	147.9

5.0 Continuous Airworthiness Maintenance Program (CAMP)

The PenAir Continuous Airworthiness Maintenance Program (CAMP) has been developed from the SAAB 2000 Maintenance Review Board (MRB) document. It has been customized to reflect the modification status of the SAAB 2000 aircraft operated by PenAir.

The PenAir CAMP manual provides the inspection program description, inspection schedules, and general procedures for implementing the program. Forms and procedures for recording discrepancies, AD's etc. may be found in the PenAir General Maintenance Manual (GMM).

All inspections within the program are based on flight hours, landing cycles or calendar time. The main body of the PenAir SAAB 2000 Inspection Program consists of ten equalized checks (E Checks). Each E Check is performed in succession at 400-hour intervals; a complete sequence of ten inspections equals 4,000 hours.

The 4,000-hour heavy inspection is a stand-alone inspection and is performed at the required time interval; the E Check inspections are performed sequentially, independent of the heavy check.

The term "equalized" refers to the way in which the applicable MRB tasks with time limits between 400 hours and 4,000 hours are equally distributed across the ten E checks. Therefore, tasks that do not come due on a 400-hour multiple will be complied with early. e.g. a 3,000-hour task would be complied with at 2,700[3] hours airframe time since there is no inspection scheduled at 3,000 hours. The procedures in the GMM Scheduled Inspections chapter provide controls to ensure inspections are properly scheduled.

[3] PenAir notes the typographical error of 2,700 hours in the CAMP Manual. It should be 2,800 hours. PenAir has revised the document to correct the discrepancy.

This inspection program also contains tasks that come due before the 400-hour intervals. These include the Line Checks 1 and 2 (LC1 and LC2) as well standalone MRB or PenAir tasks.

a. The LC1 shall be performed every 25 flight hours. The Line Check is valid for 25 flight hours or two days from last inspection whichever occurs first.
b. In the event that an aircraft does not fly for 48 hours or more after a LC1 is completed, a new LC1 shall be accomplished before that aircraft is dispatched for flight.
c. An LC2 will be performed every 50 flight hours or seven days. In addition to that, an LC2 will be performed with each CAMP inspection that requires an Airworthiness Release as well as certain Special Inspections described in 56.1.3 Special Inspections/Aging Aircraft Inspections.

The PenAir 2000 CAMP Access database located in winfiles contains the specific MRB tasks that must be complied with for all PenAir SAAB 2000 aircraft. Each task number is listed as it is found in the MRB and the applicability to each airframe is noted as well. Due to production and service bulletin upgrades, not all aircraft will be inspected with the same task number. The task number listed is also the number used to find the correct job card in the SAAB Job Card Manual, if there is an applicable Job Card. The Job Card Manual has been developed and is revised by SAAB. PenAir has developed Job Cards for tasks not included in the MRB or the Job Card manual; these tasks include additional inspection requirements by modification or reliability concerns.

The majority of cycle based and calendar-based inspections are “threshold” or “two step” type inspections (20,000/3,000 cycle - first inspection at 20,000 cycle, repeat at 3,000 cycles thereafter). At the completion of the threshold task limit the maintenance records department shall reset the inspection interval to the repeat cycle limit.

Special inspections may be required, but not incorporated into the basic inspection program. For example, one time and repetitive inspections, or inspections whose frequency or necessity is determined by conditions other than flight hours, cycles or calendar time. These inspections may include: Airworthiness Directives, Service Bulletins, Service Letters, inspections required by Aircraft modification, overweight or hard landings, lightning strikes, and flight into severe turbulence (landing, lightning, turbulent air inspections are found in the AMM). The above-mentioned inspections will be tracked by the Peninsula Aviation Services, Inc. maintenance tracking system, Computerized Aircraft Log Manager (CALM).

Aging aircraft inspection are incorporated into the SAAB 2000 CAMP by the SAAB MRB Zonal Inspection Program.

The following is the maintenance history of N686PA that lists the most recent checks completed:

Check Type	Date	Location	Total Time	Total Cycles
LC1	10/16/2019	ANC	12,612.6	9,455
LC2	10/13/2019	ANC	12,596.4	9,441
E1	8/25/2019	ANC	12,298.0	9,207
E2*	NA	NA	NA	NA

E3*	NA	NA	NA	NA
E4*	NA	NA	NA	NA
E5*	NA	NA	NA	NA
E6*	NA	NA	NA	NA
E7*	NA	NA	NA	NA
E8*	NA	NA	NA	NA
E9*	NA	NA	NA	NA
E10*	NA	NA	NA	NA
6 Month	6/12/2019	Worldwide Aircraft Services	11,969.6	8,936
12 Month	6/12/2019	Worldwide Aircraft Services	11,969.6	8,936
24 Month	6/12/2019	Worldwide Aircraft Services	11,969.6	8,936
4 Year	6/12/2019	Worldwide Aircraft Services	11,969.6	8,936
5 Year**	6/12/2019	Worldwide Aircraft Services	11,969.6	8,936
6 Year	***	***	***	***
8 Year	6/15/2017	Worldwide Aircraft Services	11,950.4	8,929

*NA – Accident aircraft was not due E2 – E10 Checks

**5 Year Inspection Tasks were accomplished with the 4 Year Inspection Tasks hence there was no 5 Year Tally sheet according to PenAir representatives.

*** The 6 Year Inspection Tasks are all Time Controlled and were completed and tracked as stand-alone tasks according to PenAir representatives.

6.0 Aging Aircraft Inspection

Per FAR 121.1105, airplanes operated in the State of Alaska and any other point within the State of Alaska are exempt from the Aging Aircraft Inspections.

However, PenAir developed a Fatigue Critical Baseline Structure Repair Log for the accident airplane. PenAir completed the fuselage survey for repairs to fatigue critical baseline structure and verified that all existing repairs were performed with damage tolerance assessment and the maintenance program requires that all future repairs to fatigue critical structure have a damage tolerance assessment prior to implementing. FAA validation of fuselage survey had not been completed at the time of the accident but would have been scheduled.

7.0 Continuing Analysis and Surveillance (CAS) System[4]

PenAir's CAS System monitors a variety of PenAir's programs, primarily the Continuous Airworthiness Maintenance Program (CAMP). The primary function of the CAS System is to ensure that PenAir's CAMP is effective. The goal of PenAir's CAS System is to identify elements that are detrimental to the overall effectiveness of the CAMP and correct those deficiencies before they become systemic problems.

[4] As established by 14 CFR Part 121.373, each certificate holder shall establish and maintain a system for the continuing analysis and surveillance of the performance and effectiveness of its inspection program and the program covering other maintenance, preventative maintenance and alterations and for the correction of any deficiency in those programs, regardless of whether those programs are carried out by the certificate holder or by another person.

The CAS System consists of the following four functions to verify performance and effectiveness:

a. Surveillance: An information gathering/audit process used to collect data to measure PenAir's program execution and measure program results.
b. Analysis: An examination process used to identify any maintenance program deficiencies and any necessary corrective actions.
c. Corrective Action: A planning process used to ensure that PenAir's corrective actions are implemented.
d. Follow-up: A performance measurement process used to verify corrective actions are effective. This is also an information gathering and analysis process, thereby closing the loop.

CAS System meetings are normally scheduled on a quarterly basis to review open key metrics, action items and critical performance measures. Meetings may be rescheduled, canceled, or combined at the discretion of the CAS System Board Chairman, but should be held at a minimum of three times per calendar year and will include a full review of four quarterly reports.

PenAir provided CAS Reports for 4th Quarter 2018, 1st, 2nd and 3rd Quarter 2019 for review. The review of the reports validated the existence of a managed CAS program. The reports were reviewed for Alerts, as wells as items in the Concerns, Comments and Observation. There were no alerts in the areas of the landing gear system, hydraulic system or flight control system in the PenAir SAAB 2000 fleet in the CAS reports reviewed.

8.0 Minimum Equipment List (MEL)[5]

PenAir was authorized to use an approved MEL on its airplanes per its OpSpecs. Tracking of all deferred items were per GMM procedures. MEL items were reviewed from June 2019 to October 2019. At the time of the accident, there were no open MEL items.

9.0 Supplemental Type Certificates (STC)[6]

Supplemental Type Certificates (STCs), supplied by air carrier, were reviewed. Two STCs were documented and installed. Both STCs (ST00807DE – Panasonic Flight Link and ST01836WI – Reinforced Cockpit Door) were accomplished on May 8, 2017.

10.0 Airworthiness Directives (AD)[7] and Service Bulletins (SB)

PenAir provided AD reports for aircraft N686PA for review. The AD reports contained the applicable Service Bulletins. A review of Airworthiness Directive status lists for the airplane, powerplants and appliances were conducted. The AD Compliance Record review found no discrepancies.

[5] The FAA approved Minimum Equipment List contains a list of equipment and instruments that may be inoperative on a specific aircraft for continuing flight beyond a terminal point.
[6] The FAA issues Supplement Type Certificates, which authorize a major change or alteration to an aircraft, engine or component that has been built under an approved Type Certificate.
[7] Airworthiness Directive (AD) is a regulatory notice sent out by the FAA informing the operator of an action that must be taken for the aircraft to maintain its airworthiness status.

11.0 Aircraft Flight Logs

Aircraft Flight Logs were reviewed from March 13, 2019 thru October 17, 2019. Per the airplane flight logs, the first revenue flight was on June 26, 2019. Besides the routine servicing and checks for the airplane, there were no significant flight log entries with regards to the landing gears, hydraulics or flight control systems. Flight Log discrepancies were signed off per PenAir GMM Procedures.

12.0 Weight and Balance Summary

PenAir uses a weight and balance program to ensure compliance with applicable airworthiness requirements and aircraft operation limitations. PenAir weighs all aircraft on scheduled basis (every 36 calendar months) to ensure accuracy of published basic operating weight data

The last weight and balance for N686PA was performed on June 16, 2019, at PenAir in Anchorage, AK.

Basic Operating Weight:	31801.4 lbs
Arm:	579 inches
Moment:	18411555 lb-inches

13.0 Service Difficulty Reports (SDR)[8] and Mechanical Interruption Summary Report (MISR)[9]

The Maintenance Group reviewed the SDR and MISR for the accident aircraft from June to October 2019. There were two SDR's and three MISR on file. There were no recent issues reported on the Flight Control, Hydraulics or Landing Gear Systems.

14.0 Major Repairs and Major Alterations

Major repairs and alterations were documented and reviewed. 18 major repairs and 4 major alterations were accomplished on N686PA. 17 of the major repairs (airframe) were accomplished by the previous operator. PenAir accomplished a major repair on a damaged lower duct assembly support angle on June 14, 2017 per EO 2000-71-01.

One major alteration (Aircraft Seating Layout Change from 50 to 40 passengers) was accomplished on March 31, 2005. The three other major alterations (Panasonic Flight Link, Reinforced Cockpit Door and LAVOX Mod) were accomplished on May 8, 2017.

[8] As required under 14 CFR 121.703, each scheduled operator is to report the occurrence or detection of each failure, malfunction or defect concerning (a) fires during flight, (b) false fire warning during flight, (c) engine exhaust system that causes damage during flight, (e) an aircraft component that causes accumulation or circulation of smoke, vapor, or toxic or noxious fumes during flight, (f) engine shutdown during flight, (g) a propeller feathering, (h) aircraft structure requiring major repairs, (i) cracks, corrosion, (j) other safety critical issues as stated in the FAR part. These occurrences must be reported within 72 hours of the event.

[9] Each scheduled operator is required under 14 CFR Part 121.705 to submit a summary of any (a) interruption to flight, (b) unscheduled change of aircraft en route, or unscheduled stop or diversion from a route caused by known or suspected mechanical difficulties or malfunctions that are not required to be reported as service difficulty reports.

15.0 Time Limit Components

The Maintenance Group reviewed the Time Limit Component reports for the airframe, engine and propeller components installed on N686PA.

Components are tracked by the manufacturer part number and serial number. PenAir utilizes Computerized Aircraft Log Manager system for the tracking of components. Components can be tracked by flight hours, flight cycles, calendar date or any combination of flight hours, flight cycles and date. No discrepancies were noted.

16.0 Vendors

The vendors, agencies and/or contractors selected to perform the maintenance, were audited by the Quality Department to ensure the maintenance practices and standards are continuously being maintained and enforced.

Repair and Overhaul Vendors audits were accomplished annually (mailers) and Essential and Substantial vendors audits were accomplished Bi-Annual (Onsite bi-annual with self-audit mailer every other year.

The Maintenance Group reviewed the Approved Vendor List provided by PenAir. There were no discrepancies in the listing that was provided.

17.0 Method of Record Keeping

The PenAir Maintenance Records Department is the central repository for all maintenance records that are retained for airworthiness. Additionally, the Records Department maintains and updates the computerized maintenance tracking system. The combination of computerized and hard copy records, along with a Cardex file system provide the means to control the airworthiness requirements necessary to operate under a Continuous Airworthiness Maintenance Program.

PenAir uses a computer software program named CALM (Computerized Aircraft Log Manager) developed by C.A.L.M. Systems, Inc. of Northbrook, IL. This program provides a database for inspection and task management. PenAir uses the CALM for tracking daily Maintenance actions and processed by Aircraft Records. CALM is maintained every business day, updating all aircraft information from documentation recorded on the Aircraft Log.

The CALM tracks total time in service (hours, calendar time, and cycles) of the aircraft, engines, propellers, and all life limited components, time since last overhaul of the aircraft, engines, propellers, appliances, and its components subject to a mandatory overhaul life. CALM tracks inspections, maintenance functions, Airworthiness Directives and Service Bulletins and aircraft checks. CALM tracks the specific time, date and methods of compliance for each applicable AD, and when the next action is required, if the AD involves recurring action. Additionally, the program tracks the current aircraft status of compliance with the PenAir Continuous Airworthiness Maintenance Program (CAMP).

18.0 Flight Data Recorder Parameter Verification

The flight recorder parameter verification at PenAir was performed every 4,000 flight hours. The last verification was accomplished by the previous operator of the airplane in March 31, 2015 at

11,699.90 flight hours. No discrepancies were noted in any of the Flight Data Recorder parameters. The accident airplane was not due a flight recorder parameter verification for another 3,082.90 flight hours. The review process verifies that each parameter is being recorded correctly and if not, corrective action is taken. The parameter verification reviews both the FAA mandatory parameters and non-mandatory parameters.

19.0 Manuals

PenAir utilizes SAAB Original Equipment Manufacturer produced manuals to maintain the fleet of aircraft which are accessed via SAAB Fleet. In addition, the following manuals are utilized.

(a) General Maintenance Manual (GMM) – This manual is designed to give instruction, policy and procedures regarding the day-to-day job functions, and the completion of routine/non-routine work. It also provides the following:

- A detail description of the Maintenance, Quality Assurance and Quality Control department's duties and responsibilities.
- The detailed procedures for compliance with code of federal regulations as required in the areas of airworthiness release, tool and equipment calibration, maintenance analysis and surveillance, required inspection items, required reports, shift or work interruption records, aircraft/engine/component and appliance records retention, deferred maintenance item procedures, maintenance alerts, etc.

(b) Continuous Airworthiness Maintenance Program (CAMP) Manual – The manual provides the maintenance program and task cards for the PenAir fleet of airplanes.

(c) CAS Program – Monitors effectiveness of the PenAir maintenance program.

(c) Minimum Equipment List – The manual allows PenAir to dispatch aircraft with equipment items listed in the FAA Approved MEL inoperative.

(d) Approved Vendor List – The list provides a list of vendors allowed to provide maintenance and services to PenAir.

(e) Manufacturer Manuals – SAAB Manuals, GE Dowty Manuals, Rolls Royce AE2100 Manuals and Component Manuals from various manufacturers.

20.0 Flight Controls System – Maintenance Program

SAAB/PenAir MPD Number	Task Description	Interval	Date Accomplished
271101/1	Lubricate aileron hinges (LH). Open access panels, lubricate the bearings, and reinstall panels.	600FH	8/25/2019
271101/2	Lubricate aileron hinges (RH). Open access panels, lubricate the bearings, and reinstall panels.	600FH	8/25/2019
271103	Inspect tension regulators for correct cable tension. Open access panels. Procedure 1: Inspect/check wing cable-tension regulators when temp is usually 68*F +/- 18*F. Procedure 2: Inspect/check wing cable-tension regulators when temp is constantly outside 68*F +/- 18*F. Procedure 3: Inspect/check fuselage cable-tension regulators when temp is	4,000 FH	3/31/2013

	usually 68*F +/- 18*F. Procedure 4: Inspect/check fuselage cable-tension regulators when temp is constantly outside 68*F +/- 18*F. Install access panels.		
271104	General visual inspection of control column chain. Remove control column covers; perform general visual inspection. Reinstall control column covers.	8,000 FH	2/36/2014
271105/1	Functional test of LH aileron torsion spring. Perform functional test of LH aileron torsion spring.	6,000 FH	2/26/2014
271105/2	Functional test of RH aileron torsion spring. Perform functional test of RH aileron torsion spring.	6,000 FH	2/26/2014
271106/1	Lubricate LH bellcrank levers fitted with grease nipples. (If installed, post SB 27-039). Lower flaps to 35*; lubricate LH aileron bellcrank levers fitted with grease nipples (if installed SB27-039, Mod. 6110). Raise flaps.	600 FH	8/25/2019
271106/2	Lubricate RH bellcrank levers fitted with grease nipples. (If installed, post SB 27-039) Lower flaps to 35*; lubricate RH aileron bellcrank levers fitted with grease nipples (if installed SB27-039, Mod. 6110). Raise flaps.	600 FH	8/25/2019
271107/1	Lubricate LH quadrant levers fitted with grease nipples. (If installed, post SB 27-039). Lower flaps to 35*; lubricate LH aileron quadrant levers fitted with grease nipples (if installed SB27-039, Mod. 6110). Raise flaps.	600 FH	8/25/2019
271107/2	Lubricate RH quadrant levers fitted with grease nipples. (If installed, post SB 27-039). Lower flaps to 35*; lubricate RH aileron quadrant levers fitted with grease nipples (if installed SB27-039, Mod. 6110). Raise flaps.	600 FH	8/25/2019
271108	Inspect and lubricate the aileron control cables in the wing. Open access panels; inspect and re-lubricate the aileron wing control cables. Install access panels.	4,000 FH	4/3/2014
271201	Functional test of LH trim actuator for freedom of movement, time required for full up and down trim system travel. Functional test of LH aileron trim tab actuator for freedom of movement, time required for full up and down trim system travel.	4,000 FH	3/13/2013
271202	Operational test of standby roll trim control from RH BAT BUS only. Operational test of the standby roll trim control and the RH trim actuator with power from an alternate source (RH BAT BUS).	4,000 FH	4/6/2011
271203/1	Check backlash of LH aileron tab mechanism. Open access panels; do the backlash test of the LH aileron trim tab. Install access panels.	6,000 FH	2/26/2014
271203/2	Check backlash of RH aileron tab mechanism. Open access panels; do the backlash test of the RH aileron trim tab. Install access panels.	6,000 FH	2/26/2014
271204	Functional test of trim tab travel time from zero to fully deflected position in both directions and for freedom of movement.	4,000 FH	3/31/2013
271205	Operational test of RH trim actuator with power from alternate power source. Do the operational test of the standby roll trim control and the RH trim actuator with power from an alternate source (RH BAT BUS).	4,000 FH	4/6/2011
271206/1	Operational test of LH trim actuator with one pushrod disconnected during trim operation in both directions. Open access panels; do the operational test of the LH aileron trim actuator with one pushrod disconnected. Install access panels.	4,000 FH	4/6/2011

271206/2	Operational test of RH trim actuator with one pushrod disconnected during trim operation in both directions. Open access panels; do the operational test of the RH aileron trim actuator with one pushrod disconnected. Install access panels.	4,000 FH	4/6/2011
271207/1	Lubricate LH aileron trim tab bearings. Remove trim tab fairings; lubricate the bearings in the hinges of the LH aileron trim tab. Install trim tab fairings.	600 FH	8/25/2019
271207/2	Lubricate RH aileron trim tab bearings Remove trim tab fairings; lubricate the bearings in the hinges of the RH aileron trim tab. Install trim tab fairings.	600 FH	8/25/2019
271208/1	Operational test of the LH variable gearing mechanism and visual check to verify that linkage has not separated. Open access panels; do the operational test of the LH aileron variable gearing mechanism and visual check to verify that linkage has not separated. Install access panels.	8,000 FH	1/31/2008
271208/2	Operational test of the RH variable gearing mechanism and visual check to verify that linkage has not separated. Open access panels; do the operational test of the RH aileron variable gearing mechanism and visual check to verify that linkage has not separated. Install access panels.	8,000 FH	1/31/2008
271401	Functional test of roll disconnect unit. Open access panel; do functional test of aileron disconnect unit. Install access panel.	6,000 FH	1/26/2012
271402	Functional test of roll spring unit. Open access panels; do functional test of aileron disconnect spring unit. Install access panels.	8,000 FH	1/31/2014
272101	Lubricate the rudder hinge bearings and servo actuator bearings. Open access panels; lubricate the rudder hinge bearings and servo actuator bearings. Install access panels.	600 FH	8/25/2019
272102	Check the rudder pedal damper oil level. Open access panels; check the oil level of the rudder pedal damper. Install access panels.	4,000 FH	3/31/2013
272103	Operational test of the rudder pedal disconnect system. Open access panel; do operational test of the rudder pedal disconnect system. Install access panel.	4,000 FH	3/31/2013
272104	Functional test of the rudder pedal transducer internal spring function. Open access panels; do functional test of the rudder pedal transducer internal spring function of LH and RH rudder pedal transducer (5CL and 6CL). Install access panels.	8,000 FH	3/31/2008
272105	Functional test of the rudder servo actuator internal spring. Open access panels; do functional test of reservoir return-valve spring for LH and RH rudder servo actuator. Install access panels.	8,000 FH	3/31/2008
272106	Operational test of the rudder servo auto rigging. Do operational test of the Rudder Control System (RCS), which includes autorigging.	4,000 FH	4/6/2011
272107	General visual inspection of rudder servo actuator installation. Open access panels; do a visual inspection of the rudder servo installation. Install access panels.	4,000 FH	1/22/2014
272108	Functional check for backlash in the rudder control Do a functional check of the rudder backlash.	4,000 FH	3/31/2013
273104/1	Lubricate the LH elevator hinge bearings and servo actuator bearings. Open access panels; lubricate the bearings in the hinges of the LH elevator and the bearings in the LH elevator servo actuators. Install access panels.	600 FH	8/25/2019

273104/2	Lubricate the RH elevator hinge bearings and servo actuator bearings. Open access panels; lubricate the bearings in the hinges of the RH elevator and the bearings in the RH elevator servo actuators. Install access panels.	600 FH	8/25/2019
273107	Visual check of the elevator stick damper oil level. Open access panels; check the oil level of the LH and RH stick damper. Install access panels.	4,000 FH	4/3/2014
273108	Operational test of servo auto rigging. Do operational test of the elevator control system (PECS), which includes autorigging.	4,000 FH	4/6/2011
273109/1	Functional test of servo actuators internal spring (LH). Open access panels. Do the functional test of the reservoir return-valve spring for the LH elevator servo actuator. Install access panels.	8,000 FH	1/31/2008
273109/2	Functional test of servo actuators internal spring (RH). Open access panels. Do the functional test of the reservoir return-valve spring for the RH elevator servo actuator. Install access panels.	8,000 FH	1/31/2008
273110/1	Functional check for backlash in the LH elevator control. Do a functional check of the LH elevator backlash.	4,000 FH	2/26/2014
273110/2	Functional check for backlash in the RH elevator control. Do a functional check of the RH elevator backlash.	4,000 FH	2/26/2014
273201	Operational test of the individual main and stby pitch trim switches. Do the operational test of the individual main and standby pitch trim-switches.	62 FH	10/13/2019
273202	Replace relays 61CC and 62CC and discard removed items Open access panels; replace elevator trim control relays 61CC and 62CC and discard removed items. Install access panels.	6,000 FH	6/9/2011
273401	Functional test of the elevator disconnect function. Open access panels; do a functional test of the elevator disconnect system. Install access panels.	6,000 FH	3/31/2013
273402	Functional test of the elevator override function. Do a functional test of the elevator override function.	4,000 FH	3/31/2013
273501	Functional test of AOA transmitter. Do the full functional test of the stall warning/identification system.	4,000 FH	3/31/2013
273502	Operational test of pusher disarm function. Do the operational test of the pusher disarm function.	4,000 FH	4/3/2011
273503	Functional test of stall warning/ident. system, relating to flap position and deicing output. Do the full functional test of stall warning/ident. system, relating to flap position and deicing output.	4,000 FH	3/31/2013
273601	Operational test of the emergency pitch trim system. Do the operational test of the Emergency Pitch Trim System (EPTS).	4,000 FH	4/6/2011
275101	Functional test of flap control operation including travel time check. Lower flaps to 35*. Do the functional test of the flap control system, applicable when you use the special tools and equipment included in the Aero pitch set, TOV 917153. Raise flaps.	4,000 FH	4/6/2011
275102	Functional test of automatic flap retraction (AFR). Do the functional test of the Automatic Flap Retraction (AFR). Applicable to S/N 004-049 with SB27-024 (Mod. 5786), and S/N 050-063 at production.	4,000 FH	5/9/2017
275103	Lubricate bellcrank levers fitted with grease nipples. (If installed, post SB 27-041). Lubricate the bellcrank levers in the LH & RH flap interconnect system, if installed (SB27-041, Mod. 6138).	600 FH	8/25/2019

21.0 Hydraulic System – Maintenance Program

SAAB/PenAir MPD Number	Task Description	Interval	Date Accomplished
290000	View EICAS (SED HYD) page, ensure hydraulic reservoir QTY is correct. Check and fill the hydraulic systems with hydraulic fluid, if necessary.	LC1	10/16/2019
291002	Dump Sys.1 and Sys.2 hydraulic accumulator pressure and check nitrogen pre-charge pressure.	400 FH	8/25/2019
291002 (LC2)	Check 1 HYD reservoir. Check and fill the hydraulic systems with hydraulic fluid, if necessary.	LC2	10/13/2019
291003	Drain Sys.1 and 2 hydraulic accumulator nitrogen pre-charge pressure and for oil leakage to gas side. Open access panels; drain Sys.1 and Sys.2 system hydraulic accumulators nitrogen pre-charge pressure and check for oil leakage to gas side of accumulator. Install access panels.	4,000 FH	4/6/2011
291004	Remove velocity fuses for overhaul. Open access panel; remove and replace hydraulic system velocity fuses for overhaul. Perform ops check and install access panel.	30,000 FH (overhaul)	7/12/2010
291005	Remove bootstrap fuses for overhaul. Open access panels; remove and replace hydraulic system bootstrap fuses for overhaul. Check for leakage and install access panels.	30,000 FH (overhaul)	7/16/2010
291005/2	Remove RH bootstrap fuses for overhaul. Open access panels; remove and replace RH hydraulic system bootstrap fuses for overhaul. Check for leakage and install access panels.	30,000 FH	9/2/2010
291006	Operational test of check valve on Sys.1 and 2 return line. Open access panels. Do operational test of check valve on hydraulic Sys.1 and 2 return line. Install access panels.	30,000 FH	7/13/2008
291009	Replace the hydraulic bootstrap fuse and discard removed units. Open access panels. Replace the hydraulic system bootstrap fuses PN 6349, and discard removed units. Check for leakage and install access panels. Applicable to S/N 004-029.	22,500 FC (Discard)	NA by Part Number
291010	Remove the IHP for electric motor overhaul Open access panel; remove and replace the hydraulic system IHP for electric motor overhaul. Install access panel. Applicable to pre-SB29-010 unmodified or modified to "A" status.	1,200 FH (Overhaul)	NA by Part Number
291011	Remove the IHP for electric motor overhaul Open access panel; remove and replace the hydraulic system IHP for electric motor overhaul. Install access panel. Applicable to pre-SB29-010 modified to "B" status or higher.	1,800 FH (Overhaul)	NA by Part Number
291012	Remove the IHP for overhaul Open access panel; remove and replace the hydraulic system IHP. Install access panel. Applicable to pre-SB29-010.	7,500 FH (Overhaul)	NA by Part Number
292001	Operational test of DC motor pump. Do the operational test of the hydraulic system DC-motor pump (number 1 auxiliary system).	100 FH	10/13/2019
292003	Check and adjust reservoir fluid level in hydraulic systems 2A and B. Inspect and, if necessary, correct the oil level in the system 2a and 2b hydraulic reservoir. S/N 060-up, or post-SB29-010.	LC2	10/13/2019
293001/1	Check LH FSOV indication together with fire handle test. Open access panels; do functional test of the LH fire shut-off valve (FSOV) of the number 1 and number 2 hydraulic systems. Afterward, do the functional test of the L ENG and R ENG Fire Handle. Close access panels.	8,000 FH	1/31/2014

293001/2	heck RH FSOV indication together with fire handle test. Open access panels; do functional test of the RH fire shut-off valve (FSOV) of the number 1 and number 2 hydraulic systems. Afterward, do the functional test of the L ENG and R ENG Fire Handle. Close access panels.	8,000 FH	1/31/2014

22.0 Landing Gear - Maintenance Program

SAAB/PenAir MPD Number	Task Description	Interval	Date Accomplished
321001	Overhaul of main landing gear (LH/RH): - Drag Brace - Shock Strut. Removal and replacement of LH/RH MLG drag brace and shock strut for overhaul.	12,000 FC or 10 YR (Overhaul)	LH: 1/25/2017 RH: 1/27/2017
321002/1	Lubricate RH MLG shock strut bearings, torque link and drag brace bearings.	600 FH	8/25/2019
321002/2	Lubricate RH MLG shock strut bearings, torque link and drag brace bearings.	600 FH	8/25/2019
321003/1	GVI of left hand gear assistor springs and overtravel link. Perform general visual inspection of LH MLG shock strut assistor springs and overtravel link.	LC2	10/13/2019
321003/2	GVI of right hand gear assistor springs and overtravel link. Perform general visual inspection of RH MLG shock strut assistor springs and overtravel link.	LC2	10/13/2019
321004/1	Check LH landing gear shock strut hydraulic fluid quantity and nitrogen pressure. Check the gas pressure and the hydraulic fluid quantity in the LH main gear shock-strut.	4,000 FH	4/6/2011
321004/2	Check RH landing gear shock strut hydraulic fluid quantity and nitrogen pressure. Check the gas pressure and the hydraulic fluid quantity in the RH main gear shock-strut.	4,000 FH	4/6/2011
321005	Replace main landing gear life–limited parts. (See 2000 ALM). Replace MLG life limited parts (LH/RH).	1,010 FC (Life Limit) 12,000 FC (Life Limit)	Part Number Dependent
322001	Overhaul of nose landing gear: - Drag brace - Shock strut. Removal and replacement of NLG drag brace and shock strut for overhaul.	12,000 FC or 10 YR (Overhaul)	Part Number Dependent
322002	Lubricate NLG shock strut, torque link and drag brace bearings.	600 FH	8/25/2019
322003	General visual inspection of NLG assistor spring. Perform general visual inspection of NLG assistor springs.	LC2	10/13/2019
322004	Check nose landing gear shock strut hydraulic fluid quantity and nitrogen pressure. Check landing gear shock strut hydraulic fluid quantity and nitrogen pressure.	4,000 FH	4/6/2011
322005	Replace nose landing gear life–limited parts. (Appendix 5, Part 3), Replace NLG life limited parts.	36,097 FC (Life Limit) 37,800 FC (Life Limit)	Part Number Dependent
323101	Operational test of LDG downlock protection. Do the operational test of the landing gear downlock protection.	4,000 FH	1/6/2011
323104	Replace the landing gear control valve, Pt. No. AIR7339-2. Open access panel. Remove and replace	62,850 FC (Discard)	Part Number Dependent

	landing gear control valve P/N AIR7339-2 located in the nose wheel well. Install access panel.		
323105	Replace the landing gear control unit, Pt. No. D701-03-001. Replace the landing gear control unit, P/N D701-03-001.	30,900 FC (Discard)	Part Number Dependent
323106	Overhaul main and nose gear retract actuators, 12H flights or 10 yr, whichever occurs first. Remove and replace MLG or NLG retract actuators for overhaul.	12,000 FC or 10 YR (Overhaul)	Part Number Dependent
323201	Functional test of LDG emergency extension system. Open access panel. Do the functional test of the landing-gear emergency extension. Install access panel.	4,000 FH	3/31/2013
323401	Continuity check of separation bolt wire circuitry. Open access panel. Do the electrical continuity test of the separation bolts. Install access panel.	4,000 FH	3/31/2013
323402	Replace separation bolts. Remove and replace LH & RH MLG door closure system separation bolts.	10 YR (Discard)	Part Number Dependent
324100	Check NLG tire Pressure and inspect tires for wear and damage.	LC2	10/13/2019
324101/1	Check LH MLG tire Pressure and inspect tires for wear and damage.	LC2	10/13/2019
324101/2	Check RH MLG tire Pressure and inspect tires for wear and damage.	LC2	10/13/2019
324201/1	Check LH MLG brake wear using the brake wear indicator	LC2	10/13/2019
324201/2	Check RH MLG brake wear using the brake wear indicator	LC2	10/13/2019
324302	Replace the brake valve, Pt. No. 71304-1. Remove and replace the parking brake valve P/N 71304-1, located in the nose wheel well. Applicable to S/N 004-019.	2,500 FH (Discard)	NA by Part Number
325001	Operational test of nose wheel steering system pressurization control. Do the functional test of the pressurization control for the nose wheel steering system.	4,000 FH	3/31/2013
325002	Functional test of nose wheel steering system limit switch. Do the functional test of nose wheel steering system limit switch.	4,000 FH*	8/23/2019

*FAA AD 1998-21-08 requires task to be accomplished every 400 hours