Trend and Oil Analysis Program

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0.1 Table of Contents

0.2 Change Log

Page	Date	Author	Comment
0-1	2017-11-22	Nickolaus Ogle	Reformatting of entire manual *(Important)*
1-1	2017-11-22	Nickolaus Ogle	Removed reference to C-208 and TBM-850 aircraft *(Important)*
1-1	2017-11-22	Nickolaus Ogle	Updated FSDO name Updated manual distribution and tracking information

0.3 Record of Revisions

Revision Number	Revision Date
0	2010-09-15
1	2017-11-22

0.4 List of Effective Pages

Approved by: Scott Litchfield FAA IPMI EA-IFSUP-63 Date: 3/19/2018 Sign:

Chapter	Page	Revision	Date	Chapter	Page	Revision	Date
		1	2017-11-22	2	1	1	2017-11-22
		1	2017-11-22	2	2	1	2017-11-22
0	1	1	2017-11-22	2	3	1	2017-11-22
0	2	1	2017-11-22	2	4	1	2017-11-22
0	3	1	2017-11-22	2	5	1	2017-11-22
0	4	1	2017-11-22	2	6	1	2017-11-22
1	1	1	2017-11-22	3	1	1	2017-11-22
1	2	1	2017-11-22	3	2	1	2017-11-22

1.1 Introduction

Tradewind Aviation's Trend Monitoring and Oil Analysis Program has been created to satisfy the needs of Federal Aviation Regulation 14 CFR 135.421(c). Tradewind Aviation's Trend Monitoring and Oil Analysis Program is based on but not limited to the information found in Pratt and Whitney S.I.L. NO. GEN-055R3, PT6A-122R1, S.B. 14001R19, and Trend Group Turbine Trend Analysis Program. Two outside vendors will be used to analyze the data and oil. The Trend Group will analyze the engine trend data and Aviation Laboratories will analyze the oil samples taken from the engines.

1.2 Models Affected

Tradewind Aviation's Trend Monitoring and Oil Analysis Program applies to all Pilatus PC-12 aircraft.

1.3 Manual Control

This manual, or any portions thereof, is made available only to persons who require its use for carrying out Tradewind Aviation, LLC's Trend and Oil Analysis Program outlined herein, or persons within the FAA who have access to it per Tradewind Aviation's Electronic Manual System.

The Director of Maintenance (DOM) is responsible for distribution, control of copies of the manual, and manual revisions. A copy of the manual will be kept in each aircraft. The structure of this manual is such that there is one master list of effective pages and log of revisions. Revisions are issued using methods described in Tradewind Aviation's Electronic Manual System processes which are found in chapter 1 of the General Operations Manual .

When a revision is necessary the DOM shall submit a revision to the Bradley Flight Standards District Office for approval. Once approved the DOM will distribute updated copies of the manual.

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2.1 ADDING NEW AIRCRAFT

Each aircraft that is added to Tradewind Aviation's Certificate and which falls under the models contained in this manual will either be given a hot section inspection or be compressor washed, bore scoped, and given an engine performance run to determine a base line for starting trend monitoring.

2.2 DATA COLLECTION METHODS

Trend data may be collected either manually or by an automatic data collector.

2.3 MANUAL DATA COLLECTION

Manual Data Collection will be used in any aircraft that does not have automatic data collection.

Use of the pilots expanded checklist for the aircraft's configuration is necessary before logging the trend. Once the checklist has been followed the pilot will then log the data on the trend data sheet. Trend data log sheets and how to fill them out will be explained at the end of this chapter (see page 2-5). Once the sheet has been filled out completely, it will be returned to the Director of Maintenance's Inbox.

2.4 AUTOMATIC DATA COLLECTION

For those aircraft that are equipped with the automatic trend data collectors, trend will be automatically logged on a data card. The data will be collected off of the aircraft in accordance with the aircraft's maintenance instruction.

2.5 DISPOSITION OF COLLECTED DATA

Fax- Trend Data that has been recorded on the trend sheets manually can be faxed to The Trend Group 24 hours a day at (800) 297-6499, inside the U.S. and (559) 297-6499, outside the U.S.

E-mail- Data that has been downloaded from an automatic data recorder that has been entered into an electronic format can be e-mailed to The Trend Group at data@thetrendgroup.com.

2.6 TIMEFRAME FOR DATA TO BE COLLECTED/DOWNLOADED

Manual collection of data will be taken once a flight day or once every 12 flying hours if the aircraft is flown more than 12 hours in one day. The collection will be done in accordance with the aircraft's expanded checklist. For data that has been collected manually, the Pilot in Command is responsible for delivering (via fax or inbox) the completed sheets (once every three flights) to the Director of Maintenance. The Director of Maintenance will then forward the data to The Trend Group once a week or when the aircraft is returned to home base but not to exceed one calendar month.

For data that is recorded automatically, the data should be downloaded and sent to The Trend Group once a week or as soon as the aircraft returns to its home base but not to exceed one calendar month.

2.7 MAINTENANCE REPORTING

Routine and unscheduled maintenance events can have a significant impact on the trend monitoring graphs. In order to perform a timely and accurate trend analysis, it is essential that maintenance reports maintenance events and associated troubleshooting procedures as soon as they are performed. Maintenance actions can be reported to The Trend Group by phone, fax, email, or web at www.thetrendgroup.com. The following list includes (but is not limited to) maintenance actions that should be reported to The Trend Group:

1. Compressor Section:
    a. When Bleed Air, Anti-Ice, or Pneumatic Reference lines are disconnected or replaced, e.g.
        - Change of fuel control unit
        - Prop governor
        - Change of anti-ice valve
        - Filter repair/ replacement
        - Aircraft air-service package work
        - Change of lines involved
    b. Foreign Object Damage (FOD)
    c. Bleed Valve changed, repaired, cleaned, or adjusted
    d. Compressor Washes
2. Hot Section:
    a. Hot Section component restoration of replacement
    b. Turbine Washes
    c. Borescope Instpections: indicate findings
    d. Fuel Nozzle changes, removal, cleaning, flow checking
    e. Engine Performance Ground Runs: indicate targets and results

3. Instrumentation Associated with Trend Monitoring Data:
    a. Fuel Flow
    b. Compressor Speed(s)
    c. Prop or Fan Speed
    d. Torque
    e. Outside Air Temperature
    f. Airspeed
    g. Altimeter
    h. Turbine/ Exhaust Temperature System including thermocouples and/ or harness
        - Any component of these systems, such as indicator, transmitter or wiring, replaced, repaired, or calibrated.

NOTE: In event of calibration, indicate discrepancy found

4. Power Section Restoration or Replacement
5. Airframe Pressurization:
    a. Environmental Control System
    b. Window & Door Seals
    c. Outflow Valve
6. Automatic Data Recorder Maintenance
7. Aircraft Performance Modifications

2.8 REPORTS

2.8.1 EMAIL CONFIRMATION

An automated email is sent to Tradewind Aviation's Director of Maintenance after the submitted trend data has been processed.

2.8.2 STATUS REPORTS

Status Reports are sent to Tradewind Aviation's Director of Maintenance on a monthly basis. This report displays the aircraft registration, engine serial numbers, the date of the first record on file, the date of the last record on file, the number of readings received in the last 30 days, and the number of outstanding trend requests. Tradewind Aviation can also obtain up to date Status Reports at www.thetrendgroup.com, 24 hours a day.

2.8.3 TREND ANALYSIS

The data will be analyzed in accordance with the parameters set forth by the manufacturer (Pratt & Whitney Canada).

2.8.4 TREND REQUEST

The Trend Request will identify the aircraft, engine serial number, position, provide a description of the noted discrepancy and suggest a recommended maintenance action to resolve the problem. Based on the severity of the noted deviation, all trend requests are assigned one of the following priorities:

Priority 1 – Take action as soon as possible.

Priority 2 – Take action at your next maintenance opportunity.

Priority 3 – Take action at your next scheduled maintenance event.

Priority 0 – Information only. No action required at this time.

All Trend Requests are sent via email to the Director of Maintenance or his designee. Trend Requests will be periodically reissued until they are closed. If a Trend Request is received that requires a maintenance action it will be logged into Fleet Status until the action is complied with. The Trend Request will be closed once The Trend Group has been notified of an acceptable corrective action. If there is a situation where the noted discrepancy has escalated to a higher priority level, the initial Trend Request will be closed and a new Trend Request will be issued that reflects the newly observed discrepancy and states the higher priority level.

2.8.5 RETENTION OF DATA AND TRENDING DOCUMENTATION

Data and supporting documentation is to be maintained by the Designated Analysis Center (The Trend Group) for a period of seven (7) years, or until the overhaul of the engine being analyzed, whichever is longer.

2.8.6 TREND MONITORING FORM

N208TW Tradewind Aviation LLC

DATE			HOUR METER	CYCLES	OAT °C +/- VALUE	ALTITUDE IN FEET (SET 29.92)	IAS (KNOTS)
MO	DAY	YR					

ITT	TORQUE	PROP	ENGINE RPM	FUEL FLOW	OIL PRES	OIL TEMP

DATE			HOUR METER	CYCLES	OAT °C +/- VALUE	ALTITUDE IN FEET (SET 29.92)	IAS (KNOTS)
MO	DAY	YR					

ITT	TORQUE	PROP	ENGINE RPM	FUEL FLOW	OIL PRES	OIL TEMP

DATE			HOUR METER	CYCLES	OAT °C +/- VALUE	ALTITUDE IN FEET (SET 29.92)	IAS (KNOTS)
MO	DAY	YR					

ITT	TORQUE	PROP	ENGINE RPM	FUEL FLOW	OIL PRES	OIL TEMP

Inside US Fax
(800) 297-6499
Outside US Fax
(559) 297-6499

TREND GROUP
TURBINE TREND ANALYSIS

Inside US Phone
(800) 297-6490
Outside US Phone
(559) 297-6490

2.8.7 COMPLETING THE BLOCKS ON THE TREND MONITORING FORM

The Following Conditions must be met before recording the Trend

Altitude BETWEEN 10 AND 30 THOUSAND FEET

Air Conditioning – OFF

Pitot Heat – ON

De-ice Systems – OFF

Allow power and accessories settings to stabilize during cruise for a minimum of five minutes.

Trend Data – RECORD

All Accessories – AS REQUIRED

Date: The date the form is filled out.

Hour Meter: Time on the tachometer at the time the trend is recorded.

Cycles: Aircraft cycles up to that leg.

OAT: Outside air temperature at the time the trend is recorded.

Altitude: Pressure altitude of the aircraft at the time the trend is recorded.

IAS: Indicated airspeed of the aircraft at the time the trend is recorded.

ITT: Indicated engine temperature at the time the trend is recorded.

Torque: Indicated engine torque at the time the trend is recorded.

Prop: Indicated propeller speed at the time the trend is recorded.

Engine RPM: Indicated engine RPM at the time the trend is recorded.

Fuel Flow: Indicated fuel flow at the time the trend is recorded.

Oil Pres: Indicated oil pressure at the time the trend is recorded.

Oil Temp: Indicated oil temperature at the time the trend is recorded.

3.1 OIL ANALYSIS

Each aircraft will have an Oil Sample drawn from its reservoir at each 100 hour inspection. The oil sample will be sent to Aviation Laboratories for a TAN and Viscosity Analysis.

3.1.1 *Tracking of the Oil Analysis*

Each aircraft Oil Analysis will be tracked in Fleet Status Maintenance Tracking Program. All lab results will be emailed to the Director of Maintenance or his designee. The lab will specify on the report if the sample appears normal or not in accordance with Pratt and Whitney SB 1001R24. If a sample does not appear normal, Tradewind Aviation will comply with the Lab Results in accordance with Pratt and Whitney SB 1001R24. This maintenance event will be tracked in Fleet Status Maintenance Tracking Program.

3.1.2 Drawing an Oil Sample

At each 100 hour inspection the mechanic will use an Aviation Laboratories Oil Sample kit to draw a sample from the oil reservoir in accordance with the instructions contained within the oil sample kits. The sample will then be mailed to Aviation Laboratories along with the associated paperwork.

3.1.3 Retention of Data and Oil Analysis

Data and supporting documentation is to be maintained by the Designated Analysis Center (Aviation Laboratories) for a period of seven (7) years, or until the overhaul of the engine being analyzed, whichever is longer.

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