NAMIBIA CIVIL AVIATION AUTHORITY

Private Bag 12003 Windhoek Namibia | (Tel) +264 61 702 212 | Web: http://www.dca.com.na

ADDITIONAL MINIMUM MAINTENANCE REQUIREMENTS FOR PISTON ENGINE CALENDAR TBO EXTENSION AND INSPECTOR'S ADVICE (FOR ALL ENGINE TYPES) INTERVAL EXTENSION

Section A

A. ENGINE GENERAL INFORMATION

Name and Address of applicant:

1. Engine Type – Model :	2. Engine Serial Number :	3. Date of Manufacture or last Overhaul :
4. TCH Calendar Overhaul Interval :	5. TCH Hourly Overhaul Interval :	6. Rate of Operation (Hours/year):

B. RECORDS OF THE ADDITIONAL MINIMUM MAINTENANCE REQUIREMENTS (FROM NEW/OH to TCH CALENDAR TBO)
(The following inspections shall be performed based on TCH publications)

Date of this annual check (**YEAR 1**):	Engine Time Since New/Time Since Overhaul:	Name and address of the approved maintenance organization:
Since the manufacturing/last overhaul, were the following conditions satisfactory:		

	Yes/No	Remark	Approval number :
Engine inspections (See Table 1 attached)			Name, reference and signature of the authorized personnel:
Compression check			
Oil change (**at least each 6 months**)			
All those maintenance actions **and their details** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.			

Date of this annual check (**YEAR 2**):	Engine Time Since New/Time Since Overhaul:	Name and address of the approved maintenance organization:
Since the manufacturing/last overhaul, were the following conditions satisfactory:		

	Yes/No	Remark	Approval number :
Engine inspections (See Table 1 attached)			Name, reference and signature of the authorized personnel:
Compression check			
Oil change (**at least each 6 months**)			
All those maintenance actions **and their details** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.			

Date of this annual check (**YEAR 3**):	Engine Time Since New/Time Since Overhaul:	Name and address of the approved maintenance organization:
Since the manufacturing/last overhaul, were the following conditions satisfactory:		

	Yes/No	Remark	Approval number :
Engine inspections (See Table 1 attached)			Name, reference and signature of the authorized personnel:
Compression check			
Oil change (**at least each 6 months**)			
All those maintenance actions **and their details** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.			

Date of this annual check (**YEAR 4**):	Engine Time Since New/Time Since Overhaul:	Name and address of the approved maintenance organization:
Since the manufacturing/last overhaul, were the following conditions satisfactory:		

	Yes/No	Remark	Approval number :
Engine inspections (See Table 1 attached)			Name, reference and signature of the authorized personnel:
Compression check			
Oil change (**at least each 6 months**)			
All those maintenance actions **and their details** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.			

Date of this annual check (**YEAR 5**):	Engine Time Since New/Time Since Overhaul:		Name and address of the approved maintenance organization:
Since the manufacturing/last overhaul, were the following conditions satisfactory:			
	Yes/No	**Remark**	Approval number :
Engine inspections (See Table 1 attached)			Name, reference and signature of the authorized personnel:
Compression check			
Oil change (**at least each 6 months**)			
All those maintenance actions **and their details** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.			

Date of this annual check (**YEAR 6**):	Engine Time Since New/Time Since Overhaul:		Name and address of the approved maintenance organization:
Since the manufacturing/last overhaul, were the following conditions satisfactory:			
	Yes/No	**Remark**	Approval number :
Engine inspections (See Table 1 attached)			Name, reference and signature of the authorized personnel:
Compression check			
Oil change (**at least each 6 months**)			
All those maintenance actions **and their details** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.			

Date of this annual check (**YEAR 7**):	Engine Time Since New/Time Since Overhaul:		Name and address of the approved maintenance organization:
Since the manufacturing/last overhaul, were the following conditions satisfactory:			
	Yes/No	**Remark**	Approval number :
Engine inspections (See Table 1 attached)			Name, reference and signature of the authorized personnel:
Compression check			
Oil change (**at least each 6 months**)			
All those maintenance actions **and their details** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.			

Date of this annual check (**YEAR 8**):	Engine Time Since New/Time Since Overhaul:		Name and address of the approved maintenance organization:
Since the manufacturing/last overhaul, were the following conditions satisfactory:			
	Yes/No	**Remark**	Approval number :
Engine inspections (See Table 1 attached)			Name, reference and signature of the authorized personnel:
Compression check			
Oil change (**at least each 6 months**)			
All those maintenance actions **and their details** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.			

Date of this annual check (**YEAR 9**):	Engine Time Since New/Time Since Overhaul:		Name and address of the approved maintenance organization:
Since the manufacturing/last overhaul, were the following conditions satisfactory:			
	Yes/No	**Remark**	Approval number :
Engine inspections (See Table 1 attached)			Name, reference and signature of the authorized personnel:
Compression check			
Oil change (**at least each 6 months**)			
All those maintenance actions **and their details** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.			

Date of this annual check (**YEAR 10**):	Engine Time Since New/Time Since Overhaul:	Name and address of the approved maintenance organization:

Since the manufacturing/last overhaul, were the following conditions satisfactory:

	Yes/No	Remark
Engine inspections (See Table 1 attached)		
Compression check		
Oil change (**at least <u>each 6 months</u>**)		
All those maintenance actions **<u>and their details</u>** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.		

Approval number :

Name, reference and signature of the authorized personnel:

Date of this annual check (**YEAR 11**):	Engine Time Since New/Time Since Overhaul:	Name and address of the approved maintenance organization:

Since the manufacturing/last overhaul, were the following conditions satisfactory:

	Yes/No	Remark
Engine inspections (See Table 1 attached)		
Compression check		
Oil change (**at least <u>each 6 months</u>**)		
All those maintenance actions **<u>and their details</u>** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.		

Approval number :

Name, reference and signature of the authorized personnel:

C. ADDITIONAL MINIMUM MAINTENANCE REQUIREMENTS - RECORDS OF THE ENGINE <u>(FROM TCH CALENDAR TBO to TCH CALENDAR TBO + 50%)</u>
(The following inspections shall be performed based on TCH publications)

Date of this annual check (**YEAR 12**):
During the last annual period, were the following conditions satisfactory:

	Yes/No	Remark
Engine inspections (See Table 1 attached)		
Compression check		
Oil change (**at least <u>each 6 months</u>**)		
All those maintenance actions **<u>and their details</u>** (i.e. compression values, inspection schedules, publications references, etc.) are properly recorded in the logbook.		

Name of the approved maintenance organization :
Approval number:
Based on the above mentioned inspections/records, I, certifying staff of the above mentioned approved maintenance organization, recommends/ do not recommend to the owner/operator an engine TBO extension up to **<u>13 YEARS</u> or <u>hours</u>,** according to the procedure defined in the approved maintenance program.

Date: Signature and reference of the authorized personnel:

I, Owner of the aircraft, hereby declare acknowledgment of receipt for the recommendation of the workshop regarding the work performed on the aircraft according to all applicable manufacturer publications.

I declare that this aircraft has never been involved in any incident/accident that could affect the airworthy condition of the engine (over speed / over boost condition, prop-strike) since the last overhaul.

According to the procedure defined in the approved maintenance program, I accept the recommendation of the approved maintenance organization and will operate the engine up-to **<u>13 YEARS</u> or <u>hours</u>**

Date:
Signature and reference of the owner/operator:

Date of this annual check (**YEAR 13**):
During the last annual period, were the following conditions satisfactory:

	Yes/No	Remark	
Engine inspections (See Table 1 attached)			
Compression check			
Oil change (**at least <u>each 4 months</u>**)			
Boroscopic inspection of the cylinder walls and of the crankshaft bearings (Corrosion, worn, unusual damage, overheat, etc.)			
Oil consumption monitoring analysis			

All those maintenance actions **and their details** (i.e. compression values, inspection schedules, **oil consumption analysis**, publications references, etc.) are properly recorded in the logbook.			

Name of the approved maintenance organization :
Approval number:
Based on the above mentioned inspections/records, I, certifying staff of the above mentioned approved maintenance organization, recommends/ do not recommend to the owner/operator an engine TBO extension up to **14 YEARS or hours,** according to the procedure defined in the approved maintenance program.

Date: Signature and reference of the authorized personnel:

I, Owner of the aircraft, hereby declare acknowledgment of receipt for the recommendation of the workshop regarding the work performed on the aircraft according to all applicable manufacturer publications.

I declare that this aircraft has never been involved in any incident/accident that could affect the airworthy condition of the engine (over speed / over boost condition, prop-strike) since the last overhaul.

According to the procedure defined in the approved maintenance program, I accept the recommendation of the approved maintenance organization and will operate the engine up-to **14 YEARS or hours**

Date: Signature and reference of the owner/operator:

Date of this annual check **(YEAR 14)**:
During the last annual period, were the following conditions satisfactory:

	Yes/No	**Remark**	
Engine inspections (See Table 1 attached)			
Compression check			
Oil change (**at least each 4! months**)			
Boroscopic inspection of the cylinder walls and of the crankshaft bearings (Corrosion, worn, unusual damage, overheat, etc.)			
Oil consumption monitoring analysis			
All those maintenance actions **and their details** (i.e. compression values, inspection schedules, **oil consumption analysis**, publications references, etc.) are properly recorded in the logbook.			

Name of the approved maintenance organization :
Approval number:
Based on the above mentioned inspections/records, I, certifying staff of the above mentioned approved maintenance organization, recommends/ do not recommend to the owner/operator an engine TBO extension up to **15 YEARS or hours,** according to the procedure defined in the approved maintenance program.

Date:
Signature and reference of the authorized personnel:

I, Owner of the aircraft, hereby declare acknowledgment of receipt for the recommendation of the workshop regarding the work performed on the aircraft according to all applicable manufacturer publications.

I declare that this aircraft has never been involved in any incident/accident that could affect the airworthy condition of the engine (over speed / over boost condition, prop-strike) since the last overhaul.

According to the procedure defined in the approved maintenance program, I accept the recommendation of the approved maintenance organization and will operate the engine up-to **15 YEARS or hours**

Date:
Signature and reference of the owner/operator:

Date of this annual check (**YEAR 15**):
During the last annual period, were the following conditions satisfactory:

	Yes/No	**Remark**	
Engine inspections (See Table 1 attached)			
Compression check			
Oil change (**at least each 4! months**)			
Boroscopic inspection of the cylinder walls and of the crankshaft bearings (Corrosion, worn, unusual damage, overheat, etc.)			
Oil consumption monitoring analysis			

All those maintenance actions **and their details** (i.e. compression values, inspection schedules, **oil consumption analysis**, publications references, etc.) are properly recorded in the logbook.			

Name of the approved maintenance organization :
Approval number:
Based on the above mentioned inspections/records, I, certifying staff of the above mentioned approved maintenance organization, recommends/ do not recommend to the owner/operator an engine TBO extension up to **16 YEARS or hours,** according to the procedure defined in the approved maintenance program.

Date: Signature and reference of the authorized personnel:

I, Owner of the aircraft, hereby declare acknowledgment of receipt for the recommendation of the workshop regarding the work performed on the aircraft according to all applicable manufacturer publications.

I declare that this aircraft has never been involved in any incident/accident that could affect the airworthy condition of the engine (over speed / over boost condition, prop-strike) since the last overhaul.

According to the procedure defined in the approved maintenance program, I accept the recommendation of the approved maintenance organization and will operate the engine up-to **16 YEARS or hours**

Date: Signature and reference of the owner/operator:

Date of this annual check (**YEAR 16**):
During the last annual period, were the following conditions satisfactory:

	Yes/No	**Remark**	
Engine inspections (See Table 1 attached)			
Compression check			
Oil change (**at least each 4! months**)			
Boroscopic inspection of the cylinder walls and of the crankshaft bearings (Corrosion, worn, unusual damage, overheat, etc.)			
Oil consumption monitoring analysis			
All those maintenance actions **and their details** (i.e. compression values, inspection schedules, **oil consumption analysis**, publications references, etc.) are properly recorded in the logbook.			

Name of the approved maintenance organization :
Approval number:
Based on the above mentioned inspections/records, I, certifying staff of the above mentioned approved maintenance organization, recommends/ do not recommend to the owner/operator an engine TBO extension up to **17 YEARS or hours,** according to the procedure defined in the approved maintenance program.

Date: Signature and reference of the authorized personnel:

I, Owner of the aircraft, hereby declare acknowledgment of receipt for the recommendation of the workshop regarding the work performed on the aircraft according to all applicable manufacturer publications.

I declare that this aircraft has never been involved in any incident/accident that could affect the airworthy condition of the engine (over speed / over boost condition, prop-strike) since the last overhaul.

According to the procedure defined in the approved maintenance program, I accept the recommendation of the approved maintenance organization and will operate the engine up-to **17 YEARS or hours.**

Date: Signature and reference of the owner/operator:

Date of this annual check (**YEAR 17**):
During the last annual period, were the following conditions satisfactory:

	Yes/No	**Remark**	
Engine inspections (See Table 1 attached)			
Compression check			
Oil change (**at least each 4! months**)			
Boroscopic inspection of the cylinder walls and of the crankshaft bearings (Corrosion, worn, unusual damage, overheat, etc.)			
Oil consumption monitoring analysis			

All those maintenance actions **and their details** (i.e. compression values, inspection schedules, **oil consumption analysis**, publications references, etc.) are properly recorded in the logbook.			

Name of the approved maintenance organization :
Approval number:
Based on the above mentioned inspections/records, I, certifying staff of the above mentioned approved maintenance organization, recommends/ do not recommend to the owner/operator an engine TBO extension up to **18YEARS or hours,** according to the procedure defined in the approved maintenance program.

Date: Signature and reference of the authorized personnel:

I, Owner of the aircraft, hereby declare acknowledgment of receipt for the recommendation of the workshop regarding the work performed on the aircraft according to all applicable manufacturer publications.

I declare that this aircraft has never been involved in any incident/accident that could affect the airworthy condition of the engine (over speed / over boost condition, prop-strike) since the last overhaul.

According to the procedure defined in the approved maintenance program, I accept the recommendation of the approved maintenance organization and will operate the engine up-to **18 YEARS or hours. At that moment, I acknowledge that the engine will undergo the necessary maintenance process as soon as the engine will reach one of the previously mentioned limits.**

Date: Signature and reference of the owner/operator:

Instructions to use this appendix:

1. This appendix is based on the classical TCH calendar TBO of 12 years; applicable to most of the engines used in general aviation (Lycoming and Teledyne Continental). However, it has to be customized to any other specific calendar TBO.

2. Start to record the inspections **at the applicable inspection year of the appendix and mention N/A** for the previous year.

3. The following table can be used as a guideline for the engine inspection done on the annual basis. However, details given here below are for indication only and will not replace the manufacturer's publications:

Component	Satisfactory Yes/No	Remark	Component	Satisfactory Yes/No	Remark
Air Filter: check for condition, cleanliness, positioning, etc.			Inspection of the pushing rods: misalignment, motion, gazes, etc.		
Cylinder Baffles: check for condition, crack, damage, positioning, etc. :			Exhaust System: check for cracks, leak, overheat, attachment, condition, etc.		
Cylinders: check for overheat, corrosion, leak, crack, etc.			Turbocharger: check for condition, overheat, attachment, leak, hoses, etc.		
Casing: check for paint, overheat, corrosion, leak, etc.			Ignition System: check for spark plugs condition, leak, etc.		
Magnetos : check for condition, serviceability, timing, etc.			Fuel System: check for leak, crack, corrosion, attachment, valve sticking, etc.		
Oil Filter / Screen : check for condition, metallic particles, etc.			Cooling System: check for leak, attachment, condition, etc.		
Throttle / mixture : check for condition, proper operation, etc.			Oil System: check for leak, attachment, condition, etc.		
Visual inspection of the engine gears and crankcase after the removal of the magnetos (corrosion, etc.)			Others (Can be developed by the owner/operator or the maintenance organisation):		

Table 1- Engine inspection guidelines

Section B

INSPECTOR'S ADVICE (FOR ALL ENGINE TYPES)

For operator that cannot provide the `year by year` information on the engine as enumerated in the preceeding paragrahs, the Inspector may consider the best practices for time in-service interval extension as follows : -

BEST PRACTICES FOR A TIME-IN-SERVICE INTERVAL EXTENSION PROGRAM.

An operator's time-in-service interval extension program can include policies and procedures for performing and documenting the following best practices.

Operators may include the following items in the program at their discretion unless required by the engine type certificate (TC).

1. Engine trend monitoring.

2. Engine oil analysis.

3. Maintaining a history of the oil consumption for each engine.

4. Accomplishing oil changes at frequent intervals (reciprocating engines).

5. Inspecting oil filter elements/oil filter debris analysis (reciprocating and turbine engines).

6. Documenting cylinder compression checks at scheduled intervals (reciprocating engines).

7. Inspecting baffle conditions to ensure proper engine cooling (reciprocating engines).

8. Inspecting the condition of the engine case.

9. Documenting borescope inspections and any findings

10. Documenting propeller balancing.

11. Documenting engine instrumentation calibrations/checks.

12. Adopting engine manufacturer or operator's engine vibration analysis/monitoring program.

13. Inspecting engine components for security and condition.

14. Ground running an engine at scheduled intervals to determine satisfactory performance of power-plant systems and static power output.

15. Using the engine manufacturer or a single source as the engine maintenance provider when seeking fleet-wide time-in-service interval extensions.

16. Verifying the quality of the maintenance provider's engine maintenance and overhaul performance. Any replacement parts recommended in the appropriate engine manufacturer's SB can be replaced at the overhaul or at the appropriate maintenance task interval.

17. Although not a regulatory requirement, installing new cylinders on a reciprocating engine at the overhaul may add to the engine's reliability.

18. Overhauling or replacing all engine accessories per the manufacturer's recommendations. Accessories play a very important part in the life of an engine.

19. Requesting engine overhaul teardown reports that show dimensional checks and wear of critical parts. Prior to tear down, you should have operated the engine to within five percent of the current approved time-in-service interval.

20. Continued compliance with the pilot's operating handbook (POH), Airplane Flight Manual (AFM), or Rotorcraft Flight Manual (RFM) can make a big difference in the reliability of the engine, and it may help to extend the TBO.

21. Using all or parts of an engine manufacturer's time-in-service interval extension program.

OTHER SUPPORTING DOCUMENTATION TO SUBSTANIATE THE PROPOSED ENGINE TIME-IN-SERVICE INTERVAL EXTENSION TO THE AUTHORITY MAY INCLUDE : -

Depending on the type of engine (i.e., turbine or reciprocating), the items that the operator should submit for review may include: -

► Mechanical Interruption Summary Reports (MISR).
► Engine Manufacturer's SBs, SIs, SILs, or Recommendations.
► Oil Analysis Reports.
► Trend Monitoring Reports.
► Engine Overhaul Teardown Reports.
► Recommendations from the Engine Maintenance Provider.
► Engine Maintenance History.
► Oil Consumption History.
►AD Records.
► Continuing Analysis and Surveillance System (CASS) Reports.
► Maintenance Review Board Report (MRBR).
► Other Data (bird strike, foreign object injection, e.t.c)