WOODCOMP

CZECH REPUBLIC

TECHNICAL MANUAL

KW-30 PROPELLER
PERFORMIG 100-HOUR INSPECTION

TN - 30

	Position	Name	Signature
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Copy Number

A.GENERALLY

1. Contens

2. Revision history

CHANGE PROCEDURE					
Revision	**Date**	**Description**	**Changed pages**	**Approved**	**Incorporation**
1	**11.08.2014**	**New edition in English language translated from TN-30, Rev. 1 valid from 11.08.2014**	**1 - 10**		
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3. List of valid pages

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4. Purpose of the document

This document – technology instruction (manual) defines the repair, assembly, and inspection procedures used during performing 100-hour inspection. This document is based on current version of KW-30 propeller's documentation, as well as the state of knowledge and practical experience from production and operation of the type. This document may be amended based on information newly obtained during manufacturing and operation of manufactured propellers.

The following documents were used in making of this document:

- Design documentation of KW-30 propeller, valid version as of 11.08.2014.
- Photo documentation of sample assembly and disassembly.
- Data from and experience of the technicians authorized to assemble the propeller.

5. Validity

This technology instruction applies to maintenance and inspection performed within Woodcomp Propellers s.r.o. organization with CZ.145.0082 Authorization, and within manufacturer's authorized service facilities.

6. Abbreviations used

AD	*Airworthiness Directive* Příkaz k zachování letové způsobilosti
AK	Firma Aleš Křemen, IČ: 279 52 428; Odolena Voda – Dolínek, Alšova 118, Okres Praha-východ, PSČ 250 70
AML	*Aircraft Maintenance License* Průkaz způsobilosti k údržbě letadel
AMO	*Aircraft Maintenance Organization* Oprávněná organizace údržby letadel
CAA CZ ÚCL	*Civil Aviation Authority of the Czech Republic* Úřad pro civilní letectví České republiky, Letiště RUZYNĚ; 160 08 Praha 6
EASA	*European Aviation Safety Agency* Evropská agentura pro bezpečnost civilního letectví
FM	*Flight Manual* Letová příručka
GO	*Overhaul* Generální oprava
ICA	*Instruction for Continued Airworthiness* Instrukce pro zachování letové způsobilosti
LC	*Aircraft Component* Letadlový celek
MEK	Methylethylketon-organická sloučenina s funkčním vzorcem $CH_3C(O)CH_2CH_3$
MM	*Maintenance Manual* Příručka pro údržbu
MOE	*Maintenance Organization Exposition* Výklad organizace údržby
ND	*Spare Parts* Náhradní díly
NDT	*Non Destructive Testing* Nedestruktivní zkoušení
OP	*Certifying Staff* Osvědčující personál / pracovník
PN	*Part Number* Číslo dílu
PART M PART 145 PART 66 PART 147	Annexes I to IV to the Commission Regulation (EC) No. 2042/2003 dated Nov 20th, 2003 on the continuing airworthiness of aircraft and aeronautical products, parts and appliances, and on the approval of organizations and personnel involved in these tasks
QM	*Quality Manager* Manažer systému řízení jakosti
SB	*Service Bulletin* Servisní bulletin
SN	*Serial Number* Výrobní číslo
TC	*Type Certificate* Typové osvědčení
TSN	*Time Since New* Celková doba provozu od uvedení do provozu
TSO	*Time Since Overhaul* Celková doba provozu od poslední GO
WP Woodcomp Propellers s.r.o.	Woodcomp Propellers s.r.o. IČ 018 93 351 Vodolská 4, Dolínek, 250 70 Odolena Voda
ZZ	*Test Equipment* Zkušební zařízení

7. Propeller inspection after 100 operating hours

Periodic 100-hour inspection is performed on the propeller mounted on the aircraft every 100 operating hours. The purpose of this 100-hour inspection is to ascertain actual situation of the propeller to provide safety and trouble-free operation until next inspection.

In the case of a defect founds, the propeller must be removed from operation.

8. Basic rules

!! **The inspection must be performed according to current versions of KW-30 documentation.**

!! **All assembly, adjustment and inspection procedures must be performed by personnel with required qualification. These activities may only be performed in enclosed facilities using clean, undamaged tools and equipment approved for the purpose.**

!! **Protect propeller parts from damage during disassembly, assembly, and adjustment. Use protective pouches for propeller blades.**

!! **Use only prescribed lubricants and/or materials to lubricate and secure propeller parts, or allowed/approved equivalents.**

!! **Maintain clean and tidy workplace including its surroundings; do not smoke.**

!! **All components destined for scrapping by this procedure must be red tagged or painted red and their disposal must be documented.**

!! **Propeller hub orientation is based on pull version – i.e. front side bears blade numbers 1, 2, and 3.**
– rear side is the flange with six M8 studs.

!! **When securing screws using locking wire, the following rule applies:**
! SCREWS MUST TIGHTEN EACH OTHER AFTER SECURING !

!! **Completion of every inspection shall be recorded to Propeller Logbook.**

B. BASIC TECHNICAL PARAMETRES OF KW-31

1. Propeller description

The propeller is intended for aircraft MTOM up to 2000kg (ELA 2), with piston engines equipped with reduction gear.

KW-30 is three-bladed, hydraulically, single-acting, in-flight adjustable propeller, working as constant speed propeller with fitted hydraulic governor. It is intended for piston engines up to 85kW (115HP) with maximum operating speed 2550rpm. Its design and functional solution is shown in the picture below. The propeller is intended for JIHOSTROJ P-110-030/A (red. ratio 2.43) or P-110-029/A (red. ratio 2.273).

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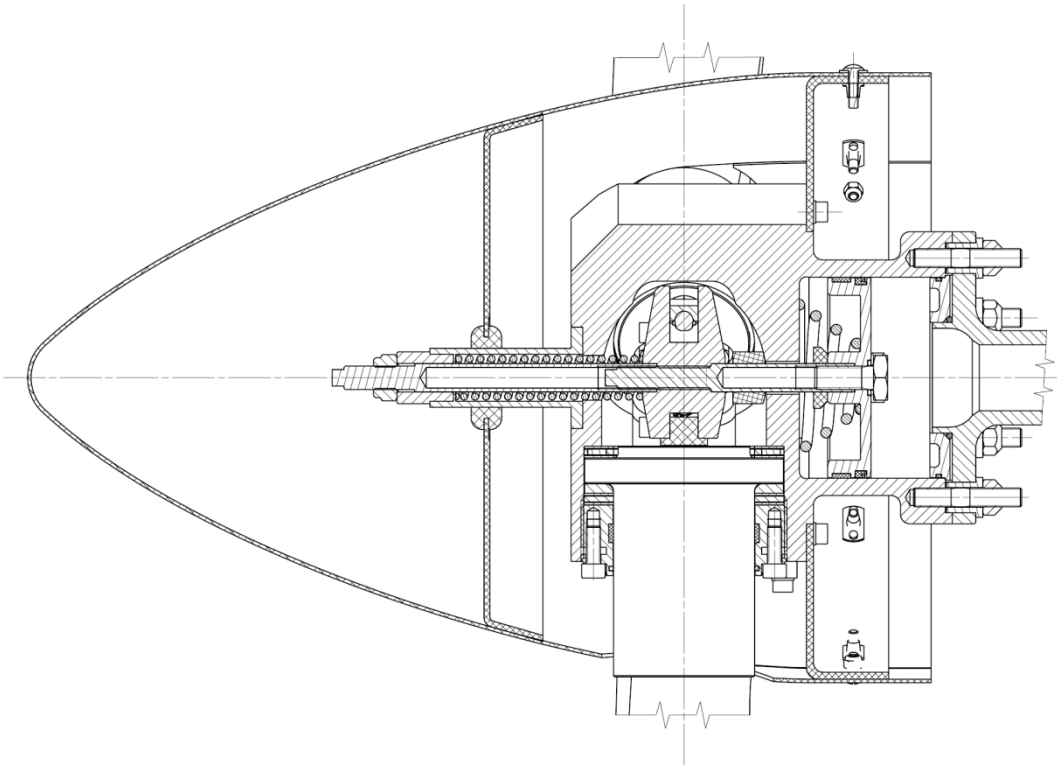

KW-30 family of propellers are designed for aircraft with piston engines coupled with reducing gearbox.

KW-30 propellers are constant speed propellers of hydro-mechanical design. In rest position (without oil pressure), propeller blades are set to minimum angle (pitch), secured by a mechanical stop.

Down pitching of blades is controlled by mass and aerodynamic effects acting on them and by means of an auxiliary screw spring in the propeller axis. Up pitching is controlled by increasing oil pressure in the propeller servomechanism, which keeps the system in equilibrium.

Control is exerted by hydraulic governor which increases oil pressure when the propeller speed goes up (“increase” type). Pressurized oil flows through propeller shaft axis into hydraulic servomechanism located in hub attachment. It consists of a cylinder, whose bottom end contacts propeller flange on the engine. Inside the cylinder, there is a piston and piston rod on which a swinging link is mounted, acting via brass stones on eccentric pins placed in blade root bushes. Blade angle down stop is located at the piston rod´s front end.

The propeller hub itself and its load carrying parts are made of aluminum alloys.

Propeller blades are made of resonation fir wood core, connected to blade root by slashing and gluing. Blade roots are made of hardened wood. Blade surface is made of glass or carbon laminate, protected by gelcoat layer. This structure has exceptional mechanical parameters, low weight, great resistance and perfect look.

Blade root is precisely machined, inserted into duralumin hub, and secured by steel screws with special thread. Blade outboard leading edges are protected against damage with a layer of cast polyurethane, their inboard part (near the propeller centre) with a self-adhesive polyurethane tape

Blade root is fixed to the hub by nut with packing to prevent lubricant leak from the bearings, with PTFE ring and 40% bronze inset. Blade root is held in two axial needle-type bearings and supporting nut.

The blade tips are painted red to improve visibility when in motion.

Composite spinner is also a part of the propeller.

2. Základní technická data vrtule

Propeller model	KW-30		
Number of blades installed	3		
Blade type	- 031 („W“)	- 033 („C“)	- 034 („B“)
Diameter	1744 ± 4 mm	1732 ± 4 mm	1648 ± 4 mm
Min. angle setting	5°		
Max. angle setting	50°		
Max. engine power output-N_{max}	115 HP		
Max. propeller RPM - n_{max}	2550 ot/min		
Temperature Service Rate	-25°C / +45°C		
Moment of mass inertia	0,51 kgm^2		
Mass of complete propeller	cca 10,6 kg acc. to type of blades and spinner		
Mass of Jihostroj governor	0,90 kg		

C.PERFORMING 100-HOUR INSPECTION

Before commencing inspection, it is necessary to clean the propeller completely, and to remove all surface dirt.

1. Inspection without engine running

1.1 Removal of propeller spinner and engine cowling

1) Switch off the ignition of aircraft ready for 100-hour inspection.
2) Use flat-bladed screwdriver to remove 9 screws with washers. Save removed screws and washers for reassembly.
3) Remove engine cowlings to gain access to engine flange and brush rings. Remove engine cowlings according to respective A/C manual. Protect removed cowlings from damage.

1.2 Check for leaking pressurized oil

1) Check front part of propeller head in front of propeller spinner. If this part of propeller head is OK, it must not be wet and greasy by leaking oil. If oil leaks at this part, it is necessary to remove the propeller from the aircraft according to its installation manual, and the repair the propeller–by replacement of seals in manufacturing plant or manufacturer's service facility.
2) Check the connection of propeller head to engine flange behind propeller spinner carrier. If oil leaks between propeller head and engine flange, it is necessary to determine the cause–see points a, b, c, d below.
   a) Loose or un–tightened M8 self–locking nuts on six studs holding propeller on engine flange. Correct according to point 4 below.
   b) Possible cause of oil leak: improperly inserted and/or damaged O-ring at engine flange neck. Also in this case, correct according to point 4 below.
   c) Damaged engine flange and/or rear face of propeller–damage to sealing surfaces (edges deformed by impact and/or scratched/otherwise damaged faces), which prevent complete contact and sufficient joining of parts. Also in this case, correct according to point 4 below.
   d) Damaged O-ring on engine flange.
3) If propeller has been supplied with intermediate piece on request, check connection between propeller head and intermediate piece for oil leak. This connection must not be wet and greasy by leaking oil. If oil leaks from this connection, it is necessary to remove the propeller from the aircraft according to its installation manual, and to repair the propeller by replacement of seals in manufacturing plant or manufacturer's service facility.
4) Perform check-tightening of M8 self–locking nuts on engine flange using ratchet with 13mm bit set to 22Nm torque. If nuts have not been completely tightened on studs, this could have been the reason for oil leak.
5) If nuts have been completely tightened, remove the propeller from the aircraft according to its installation manual.
6) After removal of propeller from the aircraft, check condition of sealing surfaces of propeller flange and engine flange.

! NOTICE !
Edges and surfaces of both flanges must not be damaged – deformed by impact!

Remove O-ring from engine flange neck and visually check its condition. If it is damaged, it is the source of oil leak.

If flanges–edges and/or faces–are damaged, deformed by impact, clean them using white spirit and dry them. Insert clean rag into opening of engine shaft and into piston area within propeller head, to prevent ingress of dirt. Use fine-toothed small flat file to clean damaged edges and surfaces. Polish using 600 to 800 grit sandpaper afterwards. Remove metal chips from all surfaces. Clean again using white spirit and dry. Remove rags from opening of engine shaft and from piston area. Recheck that no chips are present.

! NOTICE !
No chips resulting from repair of flanges are allowed behind the piston and in the opening of engine shaft!

7) Fit unused O-ring provided by propeller manufacturer onto engine flange neck and reinstall the propeller onto aircraft according to propeller installation manual.

! NOTICE !
When threading the propeller onto engine flange neck, O-ring must not be damaged.

Use new M8 self-locking nuts when assembling the propeller. Repeated use leads to loss of locking capability!

8) Clean surface of the propeller which has been hidden under propeller spinner.

9) Check intactness of locking wire and of red paint marks at the following locations:

- self-locking adjustment nut on the screw protruding from front part of propeller head; older version of propeller has two adjustment nuts secured by locking wire;
- red paint mark at two screws holding the rail on front part of propeller head;
- securing by locking wire and red paint marks on screws securing the covers of propeller blades (3 groups of six screws each);
- securing by locking wire and red paint marks six screws on spinner back side;
- three red paint marks on the perimeter of the joint flange and spacer (if a spacer is mounted).

1.3 Inspection of propeller blades

1) Check surface condition of propeller blades:

Inspect propeller blade carefully. Propeller blade must not show signs of damage, cracks, nor deformation exceeding the limits listed below.

If bigger damage, cracks or deformation is found**,** propeller must be repaired by manufacturer or authorized service facility.

Common wear and tear from operation (by friction, operation, washing, etc.) is not considered blade damage.

Check of lamination layers:

Fine cracks on lacquered surface of blade are signs of bending vibrations of propeller blade. These cracks usually appear on outer half of blade. These cracks cannot cause sudden blade failure, because blade load is carried by wooden core. We distinguish two types of cracks:

Radial cracks

Cracks within gelcoat layer only are not critical and may be repaired. Cracks must not be longer than 20mm and there must be no more than 5 cracks on one side of blade and profile.

Tangential cracks

Tangential cracks in gelcoat are caused by overloading. They may start at 1/3 of blade length measured from blade ferrule. Cracks must not be longer than 20mm and there must be no more than 5 cracks on one side of blade and profile.

Damaged areas

Damaged areas must be in gelcoat layer only, and not greater than 20mm^2, with maximum length up to 10mm.

***Check of leading edge*:**

Check that plastic protective tape is intact and check its adhesion.

Replace tape if damaged.

No cracks and fissures on leading edge surface are permitted.

Up to 3 deformations caused by impact of foreign bodies are permitted, each of them must not exceed $5mm^2$/0.5mm depth. Only deformations with blunt edges are permitted; any sharp edges could be starting points of growing defects.

In case of propeller blades with stainless leading edge protection, no puncture nor deformation of stainless strip is permitted, nowhere on the length of leading edge.

Check adhesion of stainless leading edge protection to blade surface. Edges of stainless strip must fully adhere to blade, and no gap between stainless strip edge and blade surface is permitted.

Any sign of separation of leading edge protection from blade surface is not permitted; if defects listed above are discovered, propeller must be repaired by manufacturer or authorized service facility.

2) Check axial play of individual blades in propeller hub – blades must not move (when pressed into and/or pulled off the hub).

3) Check rotational play of individual blades in propeller hub – blades must not move by more than 0º30´.

Measure play using digital level with blade in horizontal position, by measuring set angle at approximately 75% of blade length. Turn blade between end positions around its longitudinal axis.

! NOTICE !

If excessive axial or rotational play is discovered, propeller must be repaired by manufacturer or authorized service facility.

4) Check attachment of balance weights on faces of propeller hub arms and around the perimeter of spinner plate. Parts must not be loose.

5) Clean out the insides of propeller spinner and check gluing of front plate inside the spinner - it must not be loose. Check condition of rubber grommet in plate's center.

6) Check the integrity of securing bolts with wire and integrity marking red color on the blade retention nuts (3x six screws).

2. Inspection with engine running

1) Start the engine and from safe distance, visually check smooth operation of blade angle setting during repeated movements between limits. Blade angle setting must be smooth; jerkiness is not allowed. If movement is jerky, propeller must be repaired by manufacturer or manufacturer's service facility.

2) Switch off engine ignition.

3) Repeat checks acc. to paragraphs 1.4.2 and 1.4.3.

3. Completion of inspections

1) Apply thin layer of Aeroshell 5 grease to the center of grommet in propeller spinner. Thread propeller spinner onto cylindrical projection of propeller hub. Orient the spinner with its red mark on external surface towards blade 1. Blade numbers 1-3 are marked on front part of propeller hub. Press spinner to bottom on propeller hub, while also setting 9 holes for screws against nuts riveted on the carrier.
Thread plastic washers onto screws, apply few drops of (blue) Loctite 243 onto screw tips, and secure the spinner.

2) Reinstall engine cowlings according to respective A/C operating manual.

3) Turn the engine by hand with ignition switched off. If everything is OK, start the engine, let it run and check that installation of propeller spinner and engine cowlings is OK, and blade angle adjustment works normally.

4) Record performed inspection into propeller log. Record any faults discovered, including the method of correction, as well as the date/place of inspection, and who has performed it.