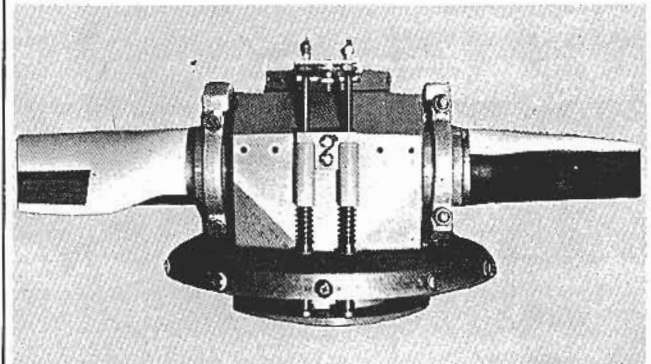


Owner's Manual

NR. E 0107.72

feathering propeller models
HO-V 62
HO-V62 R



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5th Edition, June 1990

1. GENERAL

The H0-V 62 Propeller was mainly designed and developed for powered gliders. It has a take off and a feathering position of the blades. The H0-V 62-R has an additional cruising position which gives a better aircraft performance in cruise flight.

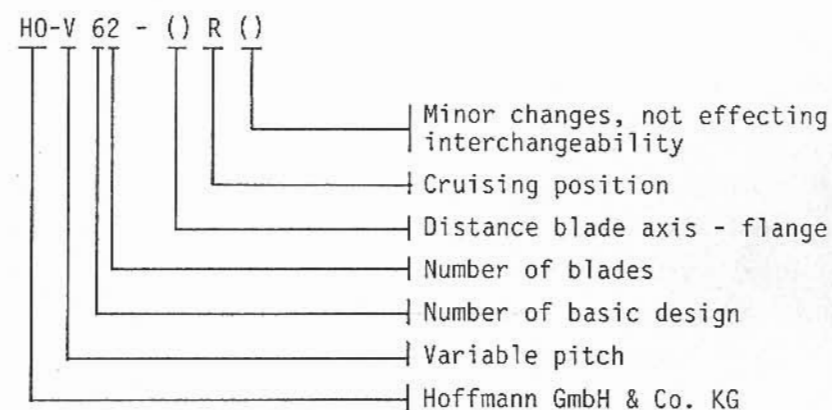
The change of the H0-V 62R from take off to cruising position and vice versa has to be done with the engine running. On both propellers the change to the feathering position has to be done with the engine stopped. The tendency of the H0-V62-R is also always to return to the take off position. However, on both propellers the blades will always return to take off position if the feathering position fails.

Blade angle adjustment is very important specially with L 160 BT (ITP) blades, installed to get maximum propeller efficiency. Instructions of aircraft manufacturers f.i. the static rpm settings must be followed carefully. Higher static rpm will not automatically give better take off and climb performance.

2. DESIGNATION

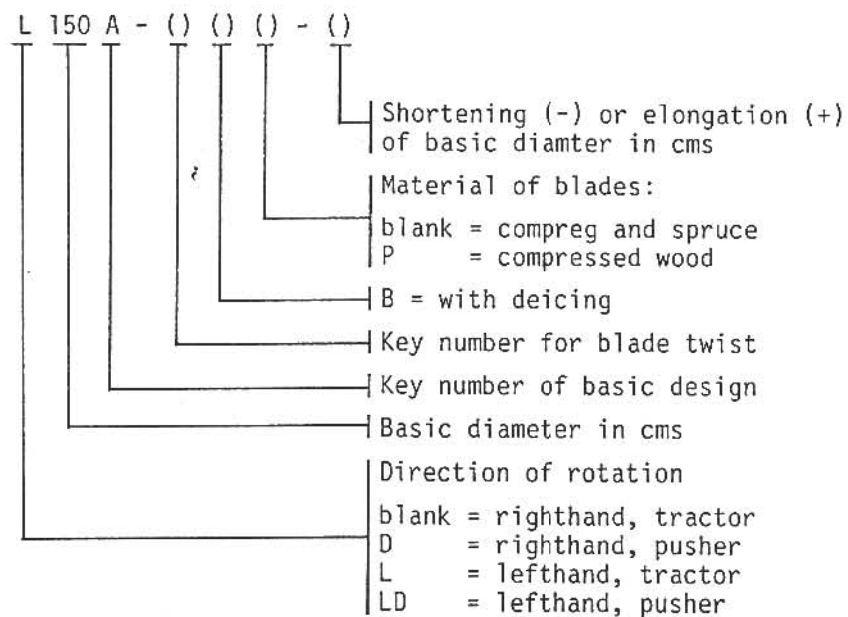
2.1 Hub designation

Model designation, serial number and year of manufacture are stamped into the hub.



2.2 Blade designation

The blade designation, serial number, date and number of inspection are on a decal on the root end of each blade. The serial number of the blade is also stamped into the butt face of the blade ferrule (not visible from outside) and on the blade retention nut.



2.3 The complete model designation of the propeller is a combination of the hub and blade designation. They are divided by a slant line. The serial number of the hub is considered to be the serial number of the propeller assembly.

HOFFMANN PROP			
HOFFMANN GMBH & CO. KG · 8200 ROSENHEIM			
Geräte-Nr.:	L.32-130/13	Part-Nr.:	VP-20-xxx-x
Nabe:	H0-V 62 R	Werk-Nr.:	xxx
Blatt:	L 150 A	Werk-Nr.:	xxx
Prüfung:	xxx	Datum:	xxx

GR8-46C

Fig. 1 Blade decal

Part number VP 20-(...)-() designates the application to a specific aircraft model.

3. PERFORMANCE DATA

The following data are guidelines only. For installation purposes, only the data given in the Geräte-Kennblatt No. 32.130/13 of the German Luftfahrt-Bundesamt are valid.

$N_{\max}$	75 HP	or	100 HP
n	at 3600 rpm		at 2800 rpm
Number of blades	2		
Diameter	150 - 170 cm		
Range of pitch change	approx. 75°		
Weight HO-V 62 (Ø 150 - 170 cm)	9.000 kg (19.8 lbs)		
HO-V 62-R (Ø 150 - 170 cm)	10.000 kg (22.0 lbs)		
Spinner	1.000 kg (2.2 lbs)		
Mounting flange	80 mm diameter bolt circle 6 bolts 7/16 - 20 UNF center bore 47 mm dia.		

4. CONSTRUCTION

4.1 Blade assembly

The Hoffmann-Composite-blade is a joint construction. It consists of totally compressed veneers (compreg) in the root part, and spruce in the rest of the blade. In addition, blades may be constructed totally of compreg. Special lag screws provide excellent connection between compreg and metal ferrule. The blades, with the exception of the ITP blade, have the same leading edge protection as successfully used on our fixed pitch composite-propellers. The blade tipping is a metal strip, soft soldered to a brass fabric and glued directly to the wooden core (type A). The glue is epoxy based.

Blade tipping B is a special Aluminum strip, which is directly fixed to the wooden core. This tipping is used on ITP-blades. To increase the torsional stiffness the blades are covered with layers of fiberreinforced epoxy. Fatigue failures due to vibration are unlikely with such blades because the internal damping of the material used is considerably higher than that of Duraluminum.

The fiberreinforced epoxy covering is sprayed with several layers of polyurethane lacquer which assures high resistance against moisture, erosion and mechanical damage without loss of necessary elasticity. Coloured lacquer is needed to protect the wood against UV-rays. The flat (thrust) side is painted with black lacquer to avoid reflexion of sun light. For safety reasons the tips are painted with a different colour to make the transparent propeller disc visible when the propeller runs.

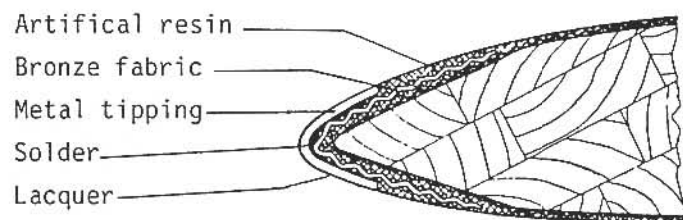


Fig. 2 Hoffmann blade tipping (Type A)

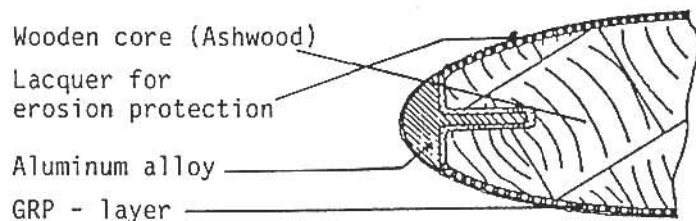


Fig. 3 Hoffmann ITP tipping (Type B)

4.2 Blade bearing

An axial needle bearing absorbs the centrifugal force of the blade. The bearing races are made of corrosion resistant steel. The needle cage is split into two halves to allow exchange of the cage without removing the blade ferrule.

The blade ferrules are made of forged aluminum alloy which is shot peened to prevent fatigue cracks. The blades are fixed into the hub by blade retention nuts, also manufactured of aluminum alloy. The necessary preload of the blade bearings is adjusted by the torque of the blade retention nut.

On the H0-V 62 the blades have no counterweights. The blades of the H0-V 62 R have counterweights to decrease the force required for pitch change. The blade nuts are sealed from outside by silicon rubber, so that no water can enter the blade bearing. A lip seal seals the blade shaft.

4.3 Hub

The hub is made of forged aluminum alloy, shot peened and anodized. At the mounting flange there are six 7/16" - 20 UNF studs installed. The propeller is mounted to the engine flange by self locking nuts. For engines Sportavia Limbach SL 1700E, which have only a flange for a fixed pitch propeller, a conversion flange VP20-483 is available.

4.4 Pitch change mechanism

In this description, all parts of the pitch change mechanism which are located outside the hub will be called "outside change mechanism" and all parts inside the hub will be called "inside change mechanism".

An important advantage of the mechanical pitch change mechanism of the H0-V 62 propeller is that no bearings run constantly with the engine rpm, but only in the short time of the pitch change.

Figure 4a Start position

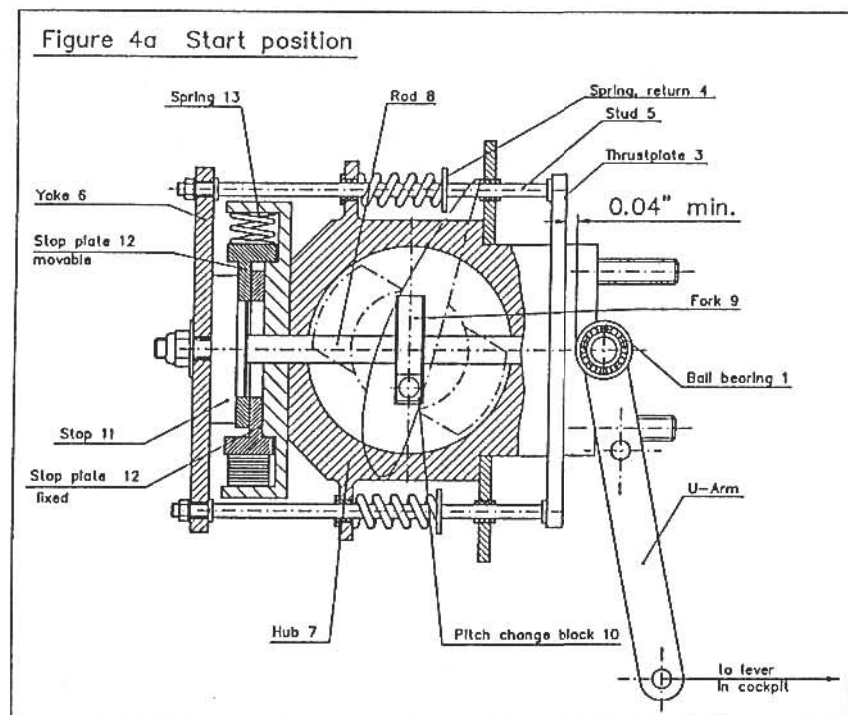


Figure 4b Cruising position

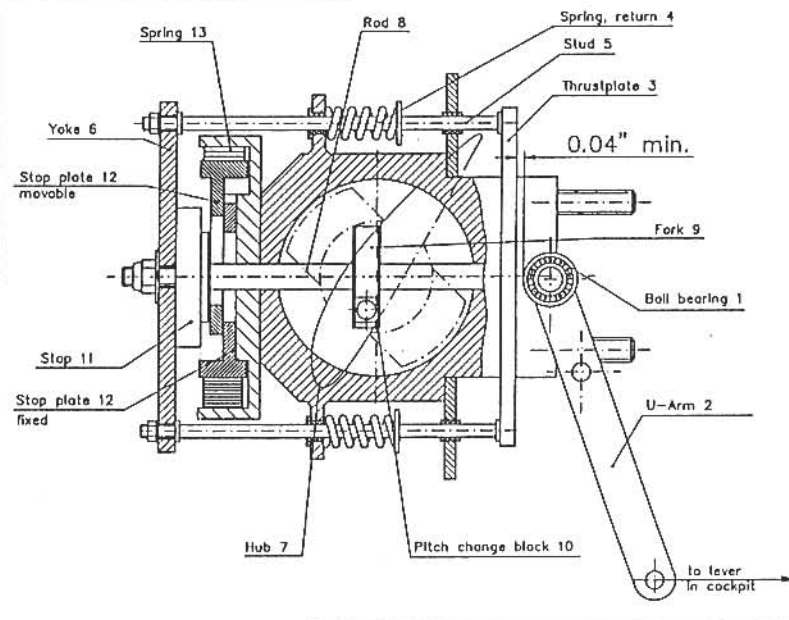
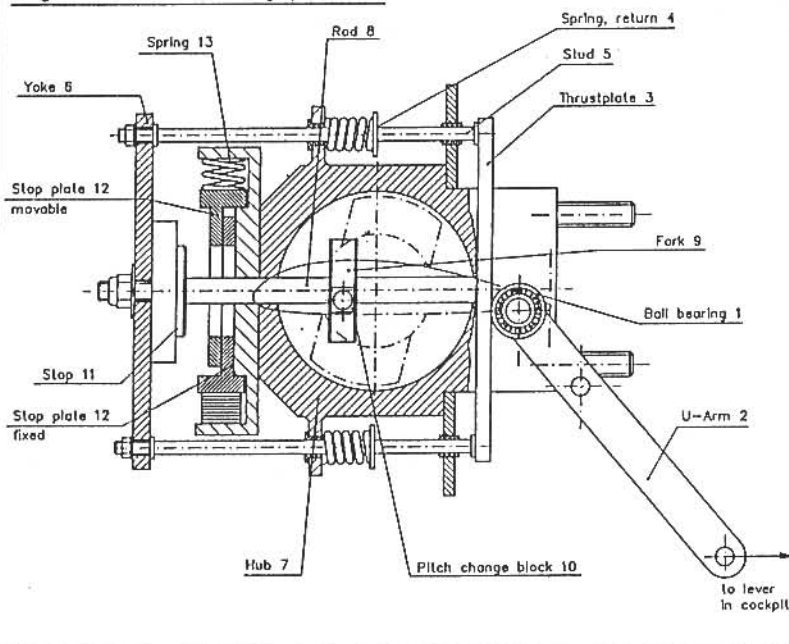


Figure 8c Feathering position



4.4.1 HO-V 62 R

For following description, please refer to figure 4.

In order to change the propeller pitch a pitch change actuating system is required. This system is installed on the aircraft engine and connected to a lever or handle in the cockpit. When a change in propeller pitch is desired, the lever (4-2) mounted on the engine, contacts the thrust plate (4-3) by means of two ball bearings, which are mounted on the lever (4-2). The force of the lever acts against the force of four springs (4-4) onto four pitch change rods (4-5) and, because of the running engine, against the natural centrifugal twisting moment of the propeller blades. The yoke (4-6) with the stop (4-11) will be pushed away from the front side of the hub (4-7).

The center rod (4-8) is connected to the fork (4-9) of the internal pitch change mechanism in the hub. The pitch change pins of the blade engage the pitch change blocks in the fork, and thereafter the blade angle will be changed.

The natural centrifugal twisting moment of the blades and the force of the springs (4-4) always tend to return the blades to the fine pitch (take-off) position.

Figure 4 shows the three possible blade angle positions. Figure 4a shows the propeller in take-off position, e.g. at the finest blade angle. The stop (4-11) is located within the stop plates (4-12) and held in position by the springs (4-4).

Figure 4b shows the propeller in cruising position with the stop (4-11) resting against the front stop plate (4-12). This means that the stop is now further forward. A movement of 1.5 mm equals a 5° greater blade angle which gives an engine rpm (full power) of approximately 500 rpm lower than take-off rpm.

NOTE

Only the front stop plate is moveable

The change from take-off pitch (fine pitch) to cruise pitch (coarse pitch) is only possible at rpm's higher than 1800 rpm because the front stop plate (4-12) is held by the spring (4-13) in down position. Only at rpm's above 1800 rpm the centrifugal force of the stop plate (4-12) overcomes the force of the spring (4-13).

If the actuating lever or handle in the cockpit is pulled at rpm's above 1800 rpm, the yoke (4-6) is lifted from the hub (4-7) and the centrifugal force compresses the spring (4-13). This allows the front stop plate (4-12) to move outward until the inside of the hole is on the connecting rod (4-8). This is the stop for the cruising position. The movement of the yoke has to be 2 mm (0.08 inch) only.

If a change to the take-off position (fine pitch) is desired without having stopped the engine and moved the propeller blades to the feathered position (after which the propeller would come back to the take-off (fine pitch) position automatically) it is necessary to reduce the rpm below 1200 rpm. Now the force of the spring (4-13) is higher than the centrifugal force of the front stop plate (4-12); a slight pull on the actuating lever or handle loosens the front stop plate (4-12) and allows the blades to return to the take-off (fine pitch) position.

Figure 4c shows the propeller in the feathered position. The correct blade angle is determined by the length of the connecting cable from the engine mounted lever (4-2) to the cockpit. The propeller blades are held against the pressure of the springs (4-4) by means of the locked lever or handle in the cockpit. The fork (4-9) acts only as a safety stop within the hub. It prevents the blades from reaching an angle from which the force of the springs (4-9) would not be able to return the blades to take-off (fine pitch) position.

4.4.2 H0-V 62

The functions of the internal and external pitch change mechanism are the same as with the H0-V 62-R. Since this propeller has only a take-off (fine pitch) and a feathering position, parts (4-12) and (4-13) are deleted. The stop (4-11) of the yoke (4-6) rests directly against the hub. The change to feathered position and back is the same as with the H0-V 62R propeller. It can only be done with the engine stopped or wind milling.

4.5 Spinner Assy

The spinner dome is one piece and made of AlMgSi alloy. The spinner dome is screwed to the spinner bulkhead which consists of an aluminum alloy centering plate and a ring. The parts are riveted together. The spinner bulkhead, which holds to the outside pitch change mechanism, is fastened to the hub by four screws M 8.

5. INSTALLATION INSTRUCTIONS

ATTENTION

Propeller installation has to be approved by a licenced engineer.

5.1 Propeller H0-V62 and H0-V62R

5.1.1 Clean propeller and engine flanges with petrol or solvent. The engine power is transferred to the propeller mainly by friction. Therefore mating surfaces must be smooth and clean.

5.1.2 Remove the spark plug from cylinder number one (closest to the propeller flange). Turn the engine until the piston of this cylinder is on its upper dead center.

5.1.3 In this position put the propeller onto the flange with the blades vertical. Use washers under the nuts and torque to 4.5 - 4.7 daNm (390 - 410 inlb).

5.1.4 Slightly grease the thrust plate along the track of the ball bearings with Calypsol H 442 or equivalent. Carefully turn the propeller while checking alignment. Maximum permissible blade track is 3 mm (0.12 inch), measured about 10 cm (4 inch) from the blade tip on the trailing edge.

WARNING

Make sure the area in front and sideways of the propeller (appr. 4 m, 1.5 feet) is absolutely clean (no sand, stone or tools) before the first engine start up. Otherwise the propeller could be damaged.

5.1.5 The actuating mechanism must be installed according to the instructions given by the aircraft manufacturer. The ball bearings must be at least 1 mm (0.04 inch) away from the thrust plate at take-off (fine pitch) position.

Check the pitch change by cycling several times to the feathered position and back. If no difficulties are encountered, run the engine. Perform a static rpm check according to the aircraft flight manual. If the engine runs rough, remount the propeller 180°.

5.2 Modification from fixed pitch propeller to variable pitch propeller on Limbach engines is possible. The engine flange must be changed according to engine manufacturer's instructions.

5.3 H0-V 62 R, rpm check

5.3.1 The values of the aircraft manual are valid. The following values are for your information only.

HOFFMANN PROPELLER



Revision to Owner's Manual

No. E 0107.72, 5th Edition

PARAGRAPH: 6. INSPECTION

Paragraph 6.2 will be changed as follows:

6.2 100 hour inspection:

Periodical inspection each 100 hours up to the overhaul time.

This revision will be incorporated in the next edition of this manual.

Rosenheim, 02. December 1992

5.3.2 The change to cruising position (coarse pitch) is only possible with the engine running. With the engine rpm at about 1800 - 2000 rpm pull the actuating lever or handle in the cockpit for a moment and release. The movement of the yoke (4-6) has to be only 2 mm (0.08 inch). With the throttle not moved, the engine rpm shall drop about 500 rpm.

5.3.3 The change from cruising position (coarse pitch) to take-off position (fine pitch) is possible with the engine running or stopped. With the engine running reduce the rpm to below 1200 rpm, pull the actuating lever for a short moment and release. Open the throttle and check static rpm. The first static rpm must be reached again.

5.3.4 Repeat this test at least three times and if there are no difficulties, install the spinner dome and conduct a flight test.

5.3.5 After the flight check the torque of the nuts. Do NOT loosen the nuts, only apply the required torque of 4.5 - 4.7 daNm (390 - 410 inlb). Make all necessary entries in the log book.

6. INSPECTION

6.1 Daily inspection

Check the blade installation. No blade shake, but radial play (angle) up to 1.5 degrees is allowed. Change the pitch by turning the blades from low to coarse pitch and back to fine pitch and watch for smooth operation. Check for loose screws and lock wires. Check all visible hub parts, spinner dome and bulkhead for cracks. If counterweights are installed, check them for proper position. Check the parts of the actuating mechanism, ball bearings and thrust plate. There must be a distance of at least 1 mm (0.04 inch) between the ball bearings and the thrust plate, if the propeller is in fine pitch position.

6.2 50 - hour inspection (periodically each 50 hours up to the overhaul time).

6.2.1 Remove spinner dome.

Clean the propeller. Check blade installation for blade shake and radial play. Check for smooth turning of the blades. Slightly grease the four pitch change rods (4-5) of the outside pitch change mechanism where they slide into the bushings. The wear of the thrust plate must not be more than 0.2 mm (0.001 inch). Clean and grease thrust plate (4-3) slightly. Check visible hub parts for cracks and corrosion. Check screws and lock wires.

6.2.3.2 Carefully inspect the area around the blade root between blade body and metal ferrule. The blades are sealed in this area with Silicone rubber material. No separation can be tolerated in the Silicone material or its connection to the metal ferrule or the blade body (contrary to description in previous manuals). If a crack is revealed in this area, the propeller has to be removed from service at once for special inspection in the factory.

Separation in the Silicone material

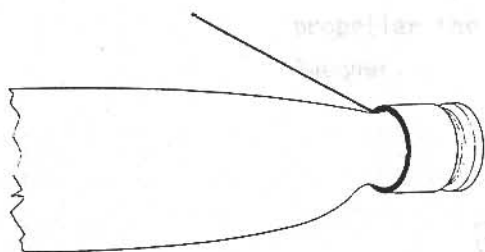


Fig. 6 No separation permissible. Contact manufacturer

6.2.3.3 A fine crack along the blade tipping or along the end of the bronze fabric is not dangerous. A fine crack at the starting point of the bronze fabric or blade tipping is also not dangerous. Sometimes such cracks occur and are a normal indication of the different dilatation of the different materials (wood, brass, bronze fabric).

During the maintenance a lacquer should be used to cover such cracks and protect the blades against penetration of

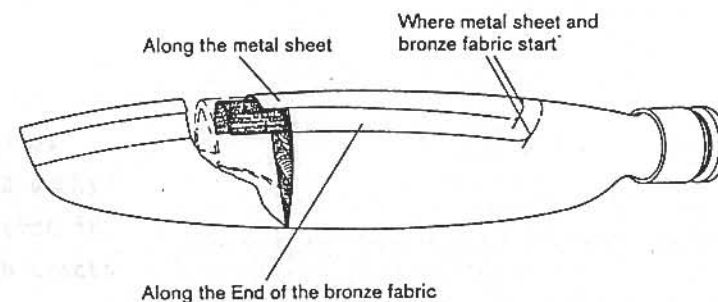


Fig. 7 Possible cracks in lacquer at leading edge - no concern. Cover with lacquer to prevent moisture to enter.

6.2.3.4 On ITP-blades the metal erosion tipping ends in the inner third of the blade length. Fine cracks in the lacquer along the metal tipping are no reason for concern. Cracks in the metal perpendicular to the blade axis are not dangerous as long as the metal does not tend to lift off from the blade body. In order to check this slide your fingernail along the leading edge from the hub to the tip. If the metal lifts off from a crack, remove propeller for repair.

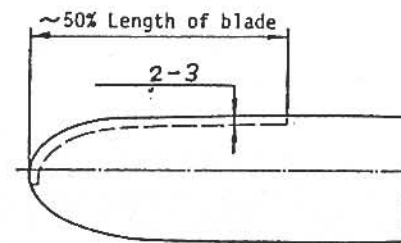


Fig. 8 Blade L160BT

- 6.2.3.5 Fine cracks in the lacquer surface or in the metal tipping across the blade axis are indications of bending vibration. Such cracks occur mainly in the outer part of the blade. No sudden blade failure can occur due to these cracks since the load is carried by the wooden core. If such cracks do occur, the factory should be informed for decision.

Cracks in the metal tipping

Cracks in the lacquer

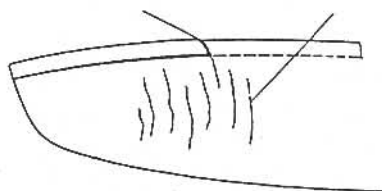


Fig. 9 Contact manufacturer

6.2.3.6 Damaged fibre glass cover

Normal stone nicks are unimportant as long as the plastic protection of the wooden core exists. Air bubbles with a maximum diameter of 1.5 cm (0.6 inch) are unimportant if the size does not increase during operation.

Scratches and nicks should be protected with water resistant lacquer during routine maintenance.

- 6.2.3.7 If there are cracks or holes in the metal sheet of the blade tipping so that the wooden core is visible, the blade tipping must be replaced in the factory. Nicks and bulges are only important if they are sharp, since cracks may start them. In any case, the wooden core should be protected against moisture.

6.3 Additional periodic inspections

New propeller-engine-aircraft combinations may require additional periodic inspections between the overhaul periods, such as partial disassembling and examination of the thrust bearing. These inspections must be done in the factory or in a propeller repair station, authorised by Hoffmann Propeller.

6.4 Overhaul

The TBO (time between overhaul) is expected to be the same of for the engine, but should not exceed the figures in Service Bulletin No. 1(), latest edition. Overhaul must be carried out by the manufacturer or by a propeller repair station authorised by Hoffmann Propeller.

6.5 Special Inspection

6.5.1 Overspeed

Up to 10% overspeed above the max. rated propeller speed according to the TCDS (LBA Kennblatt) has no effect, but periodic outside inspection has to be carried out. Between 10% and 20% overspeed overhaul has to be performed. Propellers with overspeed above 20% are considered to be unserviceable. They have to be marked as rejected.

- 6.5.2 For unconventional installations special instructions may be necessary. A conventional installation is a tractor installation on a single engine aircraft.

7. MAINTENANCE AND REPAIR

7.1 The resistance of the polyurethane lacquer of the Hoffmann wooden composite blades against fuel, oil and nearly all solvents is excellent. The propeller should periodically be cleaned with any gentle detergent or equivalent and protected with car polish, that doesn't contain silicone. In any case the surface protection (lacquer and epoxy fibreglass) should be kept completely sealed so that no moisture can enter into the wooden core.

7.2 Small scratches and nicks can easily be repaired by using epoxy resin and polyurethane lacquer. Prior to repair check that the fibreglass covering is still well bonded to the wood. Materials required for repair can be obtained from the factory. To carry out this minor repair proceed as follows.

7.2.1 Smooth damaged area with emery cloth # 220 and clean it with solvent.

7.2.2 Use filler or epoxy resin (Tixothrop) to fill the bulges, then let dry as required.

7.2.3 Again smooth the surface with emery cloth # 220.

7.2.4 Use polyurethane lacquer. It is recommended to use original lacquer, because resistance and bonding of other lacquers cannot be guaranteed. Observe drying times if several coats are painted.

7.3 Repair of Hoffmann wooden composite blades is possible at the factory. Blade tips may be rebuilt if 90% of the blade remain free of cracks. Trailing edges may be repaired, the fibre reinforced epoxy covering and the metal erosion tippings may be replaced.

7.4 Sharp nicks in the leading edge have to be blended out similar to the method used with metal propellers.

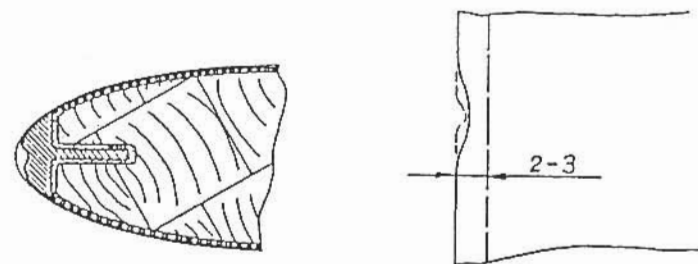


Fig. 10

NOTE: The erosion protection is only 2 to 3 mm thick.
DON'T FILE TOO DEEP !!

- 7.5 Any damage in the erosion painting of the ITP blade which may occur in the cambered area on both sides adjacent to the leading edge must be covered with lacquer as soon as it occurs.

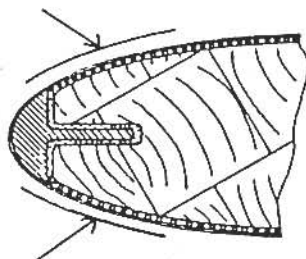


Fig. 11 Damage in the surface of the erosion painting should be repaired immediately.

8. SHIPPING AND STORAGE

8.1 Shipping

Careful packing is the best protection against damage during shipment. Therefore the propeller is shipped in a special wooden or cardboard box. This box is reusable. The blade tips and trailing edge should be sufficiently protected. The propeller should be fastened to the packing box near the hub or on the mounting bolts.

8.2 Storage

No propeller should be stored standing on the blade tips. If storage is required, it is recommended to use the original packing.

Special preservation of the propeller blades is not necessary, the existing surface protection is sufficient. Also the hub doesn't need preservation if the propeller is stored in a dry room. Specially during the cold season the propeller should not be stored near heating systems or in rooms with extreme temperature changes.

