



mt-propeller

ATA 61-09-22

E-1922

**OPERATION-, INSTALLATION- AND
MAINTENANCE MANUAL**

**REVERSIBLE HYDRAULICALLY CONTROLLED
VARIABLE PITCH PROPELLER
(CONSTANT SPEED PROPELLER)**

MTV-27-1-N-C-F-R(G)-J

MTV-27-1-()-C-F-R(P)-J

MTV-27-1-N-C-F-J



DE.21G.0008
EASA.21J.020

Revision 16: May 15th, 2024

The technical information contained in this document has been approved under the authority of EASA DOA N° EASA.21J.020.



Warning

People who fly should recognize that various types of risks are involved; and they should take all precautions to minimize them, since they can not be eliminated entirely. The propeller is a vital component of the aircraft. A mechanical failure could cause a forced landing or create vibrations sufficiently severe to damage the aircraft.

Propellers are subject to constant vibration stresses from the engine and airstream, which are added to high bending and centrifugal stresses.

Before a propeller is certified as being safe to operate on an airplane, an adequate margin of safety must be demonstrated. Even though every precaution is taken in the design and manufacture of a propeller, history has revealed rare instances of failures, particularly of the fatigue type.

It is essential that the propeller be properly maintained according to the recommended service procedures and a close watch be exercised to detect impending problems before they become serious.

Any grease leakage (see chapters 5, 6 and 7) or oil leakage, unusual vibration or unusual operation should be investigated and repaired as it could be a warning that something serious is wrong.

As a fellow pilot, I urge you to read this Manual thoroughly. It contains a wealth of information about your new propeller.

The propeller is among the most reliable components of your airplane. It is also among the most critical to flight safety. It therefore deserves the care and maintenance called for in this Manual. Please give it your attention, especially the section dealing with Inspections and Checks.

Thank you for choosing a MT-Propeller. Properly maintained it will give you many years of reliable service.

Gerd R. Mühlbauer
President
MT-Propeller Entwicklung GmbH



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0	2011-12-22	1 to 40	
1	2012-05-30	4, 5, 40;	
2	2013-07-15	4,5, 6, 7, 8, 11, 12, 13, 14, 15, 16, 17, 18, 30, 34;	
3	2014-09-17	4, 5, 8, 12, 14, 14-1, 14-2, 15, 16, 17, 18, 36, 36-1, 38-1;	
4	2015-01-12	3, 4, 5, 7, 25, 36, 37;	
5	2016-03-08	3 ,4, 5, 5-1, 6-1, 7, 7-1, 8, 35, 37;	MT-Proeller Airworthiness Limitations. Repair / Overhaul TBO
6	2016-12-08	2, 4, 5, 14,14-0,19, 29;	Grease Leackages Inspection of flight hours
7	2017-02-17	4, 5, 19, 20;	Startlock Inspection
8	2019-02-26	4, 5, 22;	Remedy of possible Damage along Erosion Sheath
9	2019-06-25	4, 5, 14-1;	Radial Clearance of carbon blocks
10	2021-06-10	4, 5, 17;	Editorial Changes; Test/check flight adjusted
11	2022-10-05	4, 5, 7, 7-1;	Bird Strike
12	2023-03-06	4, 5, 7;	FOD
13	2023-07-11	4, 5, 9, 38-2;	MTV-27-1-E-C-F-R(P)-J added
14	2023-10-19	4, 5, 19;	Inspection interval adjusted
15	2023-12-11	4, 5, 14-0;	Permatex No. 2 changed to CM13 as also Loctite 242 is permitted.
16	2024-05-15	4, 5, 14, 19, 29;	Grease Leakage



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1	2011-12-22	21	2011-12-22
2	2016-12-08	22	2019-02-26
3	2016-03-08	23	2011-12-22
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MT-Propeller Airworthiness Information

Every owner should stay in close contact with his MT-Propeller dealer or distributor and Authorized MT-Propeller Service Shop to obtain the latest information pertaining his propeller and its installation.

MT-Propeller takes a continuing interest in having the owner get the most efficient use of his propeller and keeping it in the best mechanical condition.

Consequently, MT-Propeller from time to time issues Service Bulletins, Service Letters and Manuals relating to the propeller and its installation.

Service Bulletins are of special importance and should be complied with promptly. These are sent to dealers, distributors and latest registered owners. Service Letters deal with products improvements and service hints pertaining to the propeller and its installation. Occasionally they also are sent in case of need to latest registered owners.

If an owner is not having his propeller serviced by an Authorized MT-Propeller Service Shop or MT-Propeller USA or MT-Propeller Germany, he periodically should check with a MT-Propeller dealer or distributor (see MT-Propeller's homepage to find out the latest information) to keep his propeller up to date.

The list of valid MT-Propeller Manuals, Service Bulletins, AD's and their latest revisions can be downloaded from the MT-Propeller homepage (www.mt-propeller.com).

Hardcopies can also be obtained from MT-Propeller Germany and MT-Propeller USA.

If any changes to the ICA have been made, the list of revisions in Chapter 11 will be revised.



1. GENERAL

1.1 STATEMENT OF PURPOSE

This publication provides operation, installation and maintenance information for the MT hydraulically variable pitch propeller with single acting system and reverse.

In addition to the propeller assembly, the propeller governing system is addressed in this manual.

Installation, removal, operation and trouble shooting data is included in this publication. However, the airplane manufacturer's manuals should be used in addition to this information.

1.2 ADDITIONAL AVAILABLE PUBLICATIONS

In addition to this manual the following applicable publications should be used for repair and overhaul:

OVERHAUL MANUAL ATA-61-16-80 (E-680)

Consult the manufacturers' manuals for the propeller governor and de-icing (see Vendor Publications).

For MT-Propeller service literature contact:

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1.3 VENDOR PUBLICATIONS

(for additional information only!)

Propeller Governor and De-Icing Manuals for:

Honeywell TPE-331-(): No. 33091-()	Pratt and Whitney PT6A: No.33163-() Primary No. 33048-() Overspeed
Woodward Governor Company 5001 North Second Street P.O. Box 7001 Rockford, Illinois 61125-7001 USA	Woodward Governor Company 5001 North Second Street P.O. Box 7001 Rockford, Illinois 61125-7001 USA
Service Manual 830415 (De-Icing) McCauley Accessory Division 3535 McCauley Drive Vandalia, Ohio 45377 USA	Goodrich De-Icing Systems 1555 Corporate Wood Parkway Uniontown, Ohio, 44685 USA



1.4 ABBREVIATIONS

TBO	Time Between Overhaul
TT	Total Time
TSO	Time Since Overhaul
RPM	Revolutions per Minute
SAE	Society of Automotive Engineers
UNF	Unified National Fine Thread Series
TCDS	Type Certificate Data Sheet
PU	Polyurethane
MAP	Manifold Pressure
AFM	Airplane Flight Manual
IPS	Inch per Second
FAA	Federal Aviation Administration
ICA	Instruction for Continued Airworthiness
TSN	Time Since New
STC	Supplement Type Certificate

NOTE: **TSN/TSO IS CONSIDERED AS THE TIME ACCUMULATED BETWEEN AIRCRAFT LIFT OFF AND AIRCRAFT TOUCH DOWN, I.E. FLIGHT TIME.**

1.5 TERMS AND DEFINITIONS:

Blade Angle	Measurement of blade airfoil location described by propeller rotation
Constant Speed	A propeller system which employs a governing device to maintain a selected engine RPM
Crack	Irregularly shaped separation within a material, sometimes visible as a narrow opening at the surface
Delamination	Internal separation of layers of a composite material
Erosion	Gradual wearing away or deterioration due to action of the elements
Feathering	A propeller with blades that may be positioned parallel to the relative wind, thus reducing aerodynamic drag
Overhaul	The periodic disassembly, inspection, repair, refinish and reassembly of a propeller assembly to maintain airworthiness
Overspeed	Condition in which the RPM of the propeller or engine exceeds predetermined maximum limits; the condition in which the engine or propeller RPM is higher than the RPM selected by the pilot through the propeller control lever
Pitch	Same as "Blade Angle"
Windmilling	The rotation of an aircraft propeller caused by air flowing through it while the engine is not producing power.



1.6 DEFINITION OF COMPONENT LIFE AND SERVICE

1.6.1 Overhaul

Overhaul is a periodic process and contains the following items:

- Disassembly
- Inspection of parts
- Reconditioning of parts
- Reassembly

The overhaul interval is based on hours of service (operating time) or on calendar time.

NOTE: **A GROUND STRIKE OR A FOREIGN OBJECT DAMAGE (FOD) WITH A NON-ROTATING PROPELLER DOES NOT REQUIRE AN OVERHAUL, IT ONLY NEEDS A BLADE REPAIR OR A BLADE EXCHANGE. A GROUND STRIKE OR A FOD WITH A NON-ROTATING PROPELLER CANNOT DAMAGE THE PROPELLER HUB AND THEREFORE DOES NOT REQUIRE AN OVERHAUL.**

A BLADE DAMAGE BY A GROUND STRIKE WITH A ROTATING PROPELLER REQUIRES AN OVERHAUL ONLY IF THE BLADE DAMAGE IS BEYOND THE LIMITATION OF AN IN-FIELD REPAIR ACCORDING TO SL-32.

IN CASE OF FOD (ROCKS, ETC.) EXCEEDING THE LIMIT OF THE SL-32, THE BLADE CAN BE REPLACED OR REPAIRED WITH AN ENGINEERING ORDER OR ONLY THE DAMAGED BLADE CAN BE OVERHAULED.

IF VIBRATION OCCURS AFTER BLADE REPLACEMENT THAT CANNOT BE CORRECTED BY DYNAMIC BALANCING, THE PROPELLER MUST BE REMOVED AND SENT TO AN APPROVED MT SERVICE STATION FOR FURTHER INVESTIGATION.

At such specified periods, the propeller assembly should be completely disassembled and inspected for cracks, wear, corrosion and other unusual or abnormal conditions. As specified, certain parts should be refinished, and certain other parts should be replaced.

Overhaul is to be accomplished in accordance with the latest revision of the Overhaul Manual No. ATA 61-16-80 (E-680). The overhaul interval for the propellers is shown in Service Bulletin No. 1 ().



1.6.2 Repair

Repair is correction of minor damage caused during normal operation.
It is done on an irregular basis, as required.
Consult Service Letter No. 32 or a later revision.

1.6.2.1 A repair does not include an overhaul.

1.6.2.2 Amount, degree and extent of damage determines whether or not a propeller can be repaired without overhaul.

NOTE: IN CASE OF FOREIGN OBJECT DAMAGE (FOD) OR A GROUND STRIKE WITH A NON-ROTATING PROPELLER ONLY A BLADE REPAIR IN ACCORDANCE WITH SL-32 OR A BLADE EXCHANGE IS REQUIRED.

A BLADE DAMAGE BY A FOREIGN OBJECT (FOD) OR A GROUND STRIKE WITH A ROTATING PROPELLER REQUIRES AN OVERHAUL ONLY IF THE BLADE DAMAGE IS BEYOND THE LIMITATION OF AN IN-FIELD REPAIR ACCORDING TO SL-32.

- a) Perform a thorough visual and coin tap inspection of the exposed portion (de-ice boot removal is not required) of each blade including the steel / nickel erosion protection sheath.
- b) If the blade damage is beyond airworthy limits, repair the blade before further flight in accordance with SL-32.
- c) If the blade damage is beyond major repair limits, return the blade to the factory for evaluation or retire the blade.

1.6.2.3 Bird Strike

A bird strike requires a detailed inspection for the damages on the propeller especially the blades. Special attention should be given to any delamination or loose parts along the blade or the blade metal leading edge and as applicable the de-icing system. If no visible damage can be found, just the cleaning of the prop and an entry into the prop log book is sufficient with an additional email of the event to Techsupport@mt-propeller.com. Information is needed about the flight condition, power setting, and if available, the type and size of the bird.

1.6.3 Component Life

Component life is expressed in terms of total hours of service (TSN, Time Since New) and in terms of hours of service since overhaul (TSO, or Time Since Overhaul).

Both references are necessary in defining the life of the component. Occasionally a part may be "life limited", which means that it must be replaced after a specified period of use. Life limited parts are listed in Overhaul Manual No. ATA 61-16-80 (E-680).

Overhaul returns the component or assembly to zero hours TSO (Time Since Overhaul), but not to zero hours TT (Total Time).



1.7 REVERSIBLE PROPELLERS

Reversible propellers, used primarily for turboprop installations, are similar to the feathering propellers except the pitch is extended into the beta range and a hydraulic low pitch stop is introduced. Mechanical stops are full feathering and full reverse.

The hydraulic low pitch stop, which prevents the blade pitch from entering the reverse range unless desired, consists of a „beta„ valve which stops the governor oil to the propeller when the pitch reaches the low pitch position. This valve is actuated by a linkage to the pitch change piston or piston guide rod. In order to move the propeller into reverse range, the pilot effectively changes the linkage to the beta valve which allows the propeller to travel into reverse.

The beta feedback connection of the propeller is internal (TPE-331-Series) or external on the PT6A applications.

The propellers include full feathering and reversing.

The propeller MTV-27-1-N-C-F-J has no reverse, therefore the mechanical low pitch stop is the spring guide and can not be adjusted in the field.

Natural composite blades with fiber reinforced Epoxy cover and metal leading edge protection are used to minimize weight at the highest amount of safety against fatigue fractures due to vibrations.



2. MODEL DESIGNATION

2.1 HUB DESIGNATION

MTV - 27 - 1 - () - C - () - () - () ()
 1 2 3 4 5 6 7 8 9 10

- | | |
|----|---|
| 1 | MT-Propeller (manufacturer) |
| 2 | Variable Pitch Propeller (V) |
| 3 | Consecutive number of basic type |
| 4 | Consecutive number of series
(1 = applicable for MTV-5, MTV-16, MTV-25, MTV-27) |
| 5 | Code for propeller flange
E = ARP 880
N = BCD 5,125 inch; twelve 9/16"-18UNF |
| 6 | Letter designation counterweights
C = counterweights mounted for pitch change moments
towards high pitch/feathering |
| 7 | F = Feathering system installed |
| 8 | R = Reversing system installed |
| 9 | (P) = Reverse system Pratt and Whitney PT6A-()
(G) = Reverse system Garrett TPE-331-()
(W) = Reverse system Walter M601-() |
| 10 | Small letter: Modifications, not affecting interchangeability
Capital Letter: Modifications, restricting or excluding interchangeability |



2.2 BLADE DESIGNATION

() () 285-82 ()
1 2 3 4 5

- 1 Position of actuation pin:

C	=	pitch change pin for pitching moment towards high pitch
CF	=	pitch change pin for feathering, pitching moment towards high pitch
CR	=	pitch change pin for reversing, pitching moment towards high pitch
CFR	=	pitch change pin for feathering, reversing, pitching moments towards high pitch
- 2 Sense of Rotation:

blank	=	right hand tractor
RD	=	right hand pusher
L	=	left hand tractor
LD	=	left hand pusher
- 3 Diameter in cm
- 4 Consecutive number of basic type (including aerodynamic design):
- 5 Capital Letter: Modifications, restricting or excluding interchangeability
Small Letter: Modifications not affecting interchangeability

The complete propeller designation is a combination of both designations, for instance MTV-27-1-N-C-F-R(G)-J/CFR285-82.

The hub-serial No. starts with the year of manufacture. All records of the propeller are registered in respect to this number.

The propeller for a certain aircraft-engine combination is always defined according the hub-, blade- and spinner combination. For the actual blade settings, depending on the aircraft model, the propeller- logbook or the „Gerätelaufkarte,“ must be considered.



3. PERFORMANCE DATA

For the general performance data refer to the applicable propeller TCDS. For operation refer to your Propeller-Logbook.

Type of Flanges:

E = ARP 880

studs 9/16 "- 18 UNF

N = e.g. TPE331-14GHR
or PT6A-67/68

studs 9/16" - 18 UNF



4. DESIGN AND OPERATION INFORMATION

The variable pitch propeller consists of the following main groups:

- Hub with blade retention
- Pitch change mechanism
- Blades
- Counterweights
- Spinner
- Propeller Governors
- Propeller de-icing

4.1 HUB

The one-piece hub is made from forged or milled aluminum alloy with the outer surface shot-peened and anodized. The blade bearings are special designed ball bearings, whereas the balls act as split retainers in order to hold the blades in the hub, creating an increased safety factor against blade loss. The outer bearing race is a one-piece part and pressed into the hub, while the inner race is split and installed on the blade ferrule or blade root. The blade preload is adjusted by the thickness of plastic shims. Blade and bearing are held in the hub by a retention ring.

The inner part of the hub is used as the cylinder for the pressure oil. This arrangement allows a simple and lightweight design. The front spinner support is used to have the balance weights installed.

4.2 THE PITCH CHANGE MECHANISM

The pitch change mechanism of the blades is obtained with a pin in the blade root. A plastic block connects the blade with the piston extension and the axial movement of the servo piston turns the blades.

On the front piston guide the return spring is installed enabling feathering. With the Walter System the reverse system is dual acting, whereas feathering is achieved by using oil pressure.

The hydraulic pitch change mechanism contains a piston. In the normal operating range the pitch change piston moves between full feathering and the hydraulic low pitch stop. In the beta range the hydraulic low pitch stop moves via the beta linkage until the needed negative thrust is reached.

4.2.1 For Garrett / Honeywell Application

Outside the hub are two check nuts. High pitch feathering stop can be adjusted by turning the check nuts. The beta tube is installed in the guide rod. Due to turning the beta tube inside or outside, the hydraulically low pitch stop can be adjusted.

The beta tube is secured by the screw AN3H-13A and the stop nut MS 20364-1032A. Put on both sides washers AN 960-10.

4.2.2 For Pratt and Whitney Application

Outside the hub there are check nuts and in the inner part of the hub there are 3 stop nuts. High pitch/feathering can be set by turning the check nuts. Low pitch can be set by turning the 3 internal stop nuts. The full reverse stop is not adjustable in the field.

Warning:

The 3 stop nuts must always have the same setting to each other, otherwise the pitch change mechanism will be damaged.



- 4.2.3** For the MTV-27-1-N-C-F-J outside the hub are two check nuts. High pitch feathering stop can be adjusted by turning the check nuts. The low pitch stop cannot be adjusted in the field.

4.3 BLADE

The presently used blades are in natural composite, using high compressed wood in the root and lightweight wood in the remaining body. Epoxy composite covers the entire blade surface and is painted with acryl lacquer. The outer portion is protected against erosion by a bonded on Nickel alloy erosion sheath. The inner portion of the blade is protected by a bonded on electrical de-ice boot.

The blade ferrule is installed with special lag screws on the blade root and is additionally bonded with Epoxy resin.

4.4 COUNTERWEIGHTS

Propellers with reverse and feathering are usually equipped with counterweights on the blade root. The pitch change pin is in a defined position and the blades are identified with a "C", for example C230-83. Propeller blades for feathering propellers are identified with "CF". Propeller blades for reversible propellers are identified with "CFR".

4.5 SPINNER

The spinner dome is a one-piece part made from fiber reinforced composite. The bulkhead is spinformed or truncated aluminum alloy.

The front support is part of the hub. Filler plates increase the stiffness of the dome on the cutouts for the blades. The dome is mounted on the supports by means of screws.

4.6 PROPELLER GOVERNOR

See Woodward Manual for:
Garret TPE-331-(): No. 33091-()
PT6A: No. 33163-() Primary
No. 33048-() Overspeed

4.7 PROPELLER DE-ICING

The de-ice boots are bonded onto the blades as usual. The rest of the system is equal to existing components, with slipring and wire harness.

Attention:

Do not operate a propeller with electrical de-icing system without spinner dome as this will cause damage to the de-icing System - Wiring



5. INSTALLATION AND OPERATION INSTRUCTION

- 5.1 The described propellers are usually installed on the engine with the blades in feathering position
- 5.2 Complete McCauley kits have to be installed according to Manual 830415 for the Jetstream 41 Application.
Observe the limitations during ground operation in order to avoid damage of the de-ice boots (overheating).
- 5.3 Clean propeller and engine flange with solvent or gasoline. Both surfaces must be dry and clean. Remove all surface defects.

Remove shipping plugs and protective wrap!

- 5.4 Check position of O-ring in propeller flange.

Warning:
Do not install an additional O-ring on engine flange.

5.4.1 GREASE LEACKAGES

NOTE:

THE FIRST RUN-UP OF A NEW OR OVERHAULED PROPELLER ASSEMBLY MAY LEAVE GREASE ON THE BLADES AND INNER SURFACE OF THE SPINNER DOME. THIS IS NORMAL AND DOES NOT MEAN THAT IT WILL BE A CONTINUING GREASE LEAKAGE.

Condition	Resolution
Minor film of grease (sweating), but not present on Blades, Hub, etc.	Normal operation, monitor only. Clean with mild solvent as required.
Grease Leakage spraying 18 cm (7 inches) or less from blade root (when first detected).	First occurrence, clean blade(s), hub and spinner with mild solvent as required and monitor for 5 flight hours.
Grease Leakage spraying 18 cm (7 inches) or less from blade root when continuing past initial 5 hours of monitoring.	Clean blade(s), hub and spinner with mild solvent as required and monitor for an additional 20 flight hours.
Grease Leakage spraying 18 cm (7 inches) or less from blade root when continuing past additional 20 hours of monitoring.	Within 5 flight hours, remove prop and send to authorized shop.
Grease Leakage spraying greater than 18 cm (7 inches) from the blade root when first detected.	Take photos and send to MT Techsupport for instructions to proceed. 5 flight hours are allowed after initial detection of grease leakages beyond 18 cm (7 inches) from the blade root.

IN CASE OF DOUBT, CONTACT MANUFACTURER / MT TECHSUPPORT FOR FURTHER ACTION!



5.5 FOR PT6A-() APPLICATION

If applicable, release the puller (T-375-D) and disconnect it from the guide rod (Drawing see chapter 10).

If applicable move Beta-ring back, and if necessary, apply engine oil on to the thread of the cover cap, reinstall cap by hand and safety wire. Make sure that all removed parts are reinstalled (spring, spring guide and cover caps).
Torque the cap with 7.5 ftlbs and safety wire.

NOTE: **INSTALL COVER CAPS JUST BY HAND, OTHERWISE THE THREAD IN THE FRONT PLATE MAY BE DAMAGED.**

5.5.1 Check run out wobble of the Beta-ring to be within 0,008 inch.

Set of the wobble with check nut No. 2 (see Figure B on Page 14-1)

NOTE: **SAFETY WITH ELASTIC LOCKING MATERIAL (I.E. CM13¹)**

¹ See E-9000 „List of Consumables“



5.6 CARBON BLOCK ASSEMBLIES FOR PT6A-() APPLICATIONS

- 5.6.1** Check free movement of the carbon block in beta ring. If there is not the required clearance, re-work according to figure A by sanding the block(s) side(s) as required.
- 5.6.2** Install carbon block assy in beta lever of the engine.
- 5.6.3** There have been a number of instances when the clearance between the yoke pin of the carbon block and the corresponding linkage have become too close due to a build up of plating and foreign particles between the two copies. This may cause a binding action and result in excessive wear to the carbon block, beta-ring and beta linkage (see Figure A).

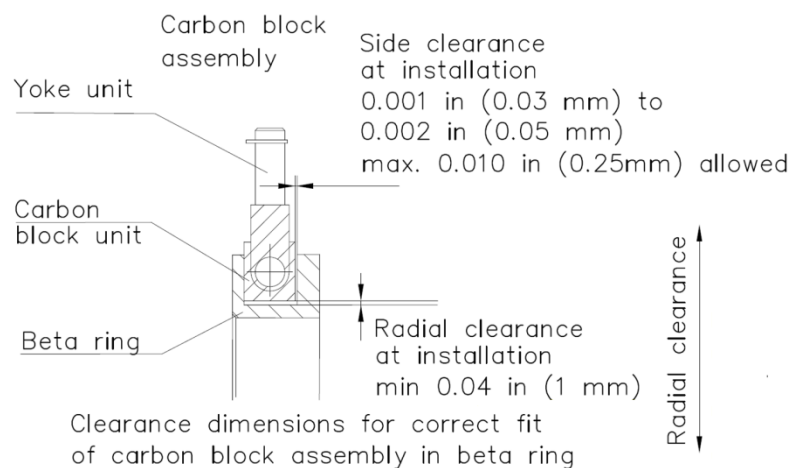


Figure A

Warning:

When assembling ensure a radial clearance of min. 1 mm (0.04 in) from carbon brush to the beta ring to avoid fatigue loads and thus damage to the yoke unit. The carbon block needs to be assembled without any pre-load!

- 5.6.4** If the system indicates a presence of binding, the following steps have to be followed:
- Remove the carbon block assemblies from the beta lever,
 - Polish the yoke pin to provide adequate clearance (see Fig. A),
 - Reinstall the carbon block assembly into the beta lever using a dry lubricant between the yoke pin and the beta collar. Safety with snap ring.
- 5.6.5** Install the beta linkage with carbon block assy into the beta ring and inspect system for free movement.

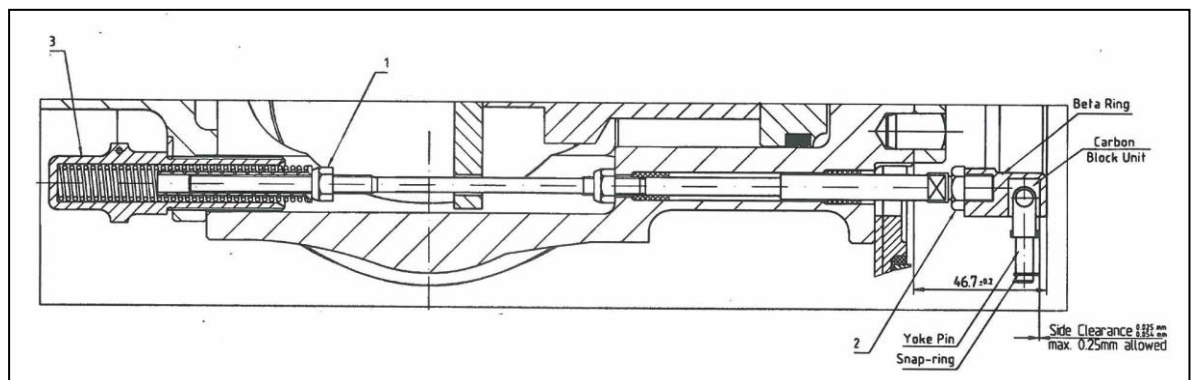


Figure B



- 5.6.6** Check the position of the beta-valve in the propeller governor (beta-zero-position) after the whole beta linkage is installed and connected to the beta control. The slot in the valve must be flush with the front of the beta valve cap. If this is not the case, the connection of the beta control must be rigged according to the engine manufacturerers instructions (see Figure C).

Check free movement of the beta valve in the governor.

Consult also engine- and aircraft maintenance manuals.

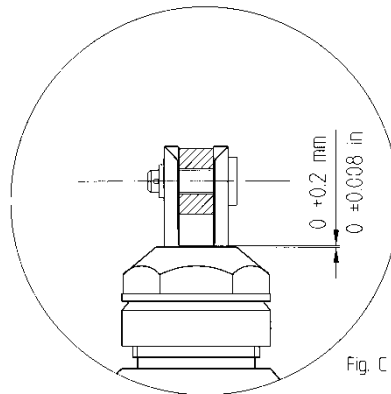


Figure C

5.6.7 For the PT6A Application

Due to turning the stop nuts no. 1 (see fig.III, page 19) in or out, the low pitch stop can be adjusted. Therefore remove the cover caps no. 3 with the spring and spring guide.

Turning IN → higher pitch

Turning OUT → lower pitch

→ Use Socket Wrench Tool T-718-716 (7/16 inch) for turning stop nuts



Warning:

All 3 or 4 stopnuts must have the same setting to each other, if not, the pitch change mechanism could be damaged because of the wobbling of the beta-ring.

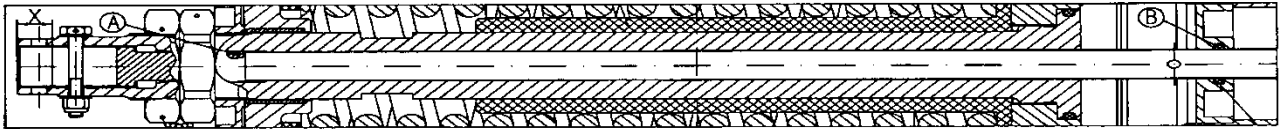
Warning:

Low pitch stop has to be adjusted in compliance with the description of the airplane manufacturer, for example on PT6A-() engine, torque versus rpm, depending on density altitude and temperature, e. g. 650 ftlbs at 1800 rpm, S.L. standard day. Additional the min. propeller rpm must be reached at ground idle, see flight manual.



5.7 FOR GARRETT / HONEYWELL APPLICATION ONLY

Measure the distance „X„ (see fig. II) for the dimension, how far the beta tube must be turned in (was recorded during previous propeller removal). This is important to set the low pitch stop. The O-ring „B„ (see fig. II) for the Beta-tube in the engine flange and on the Beta-tube „A„ (see fig. II) must be replaced with every propeller installation.



Figur II

Figure II

Attention:

Never pull a propeller onto the engine flange by the bolts, only install by hand.

- 5.8 Stop nuts with washers should be tightened crosswise with equal force

Mounting Torques:

For lubricated torques only:

9/16" - 18 UNF stopnuts 92 - 98 NM (68 - 72 foot-pounds)

Generously apply anti-seize thread compound per MIL-T-83483 (e.g. Loctite® Moly 50™) only, to threads of studs & nuts; also to faces of nuts & washers

5.9 FOR THE GARRETT / HONEYWELL APPLICATION ONLY

Low Pitch Set up (Flight Idle) and positioning the blades at the start lock by using the unfeather pump.

After the propeller was installed with the blades in feathering position, use the unfeathering pump to adjust low pitch blade angle (flight idle) according to the aircraft maintenance manual and installation instruction. To use the unfeather pump, first install Beta Rod into the propeller guide rod.

Continue to use the pump for moving the prop into the start locks by lifting the power lever over the flight idle gate and into full reverse until start lock latches engage. Then move power lever back to flight idle position.



5.10 POSITIONING THE BLADES AT THE START LOCK BY USING THE START LOCK PULLER (FOR GARRETT APPLICATION ONLY)

If Beta Rod is already installed, remove Beta Rod from the propeller guide rod.

NOTE: IF BETA-ROD IS NOT REMOVED BEFORE INSTALLING THE START LOCK PULLER T-751-1, THE THREAD IN THE PROPELLER GUIDE ROD WILL BE DAMAGED.

Install the start-lock puller T-751-1 to bring blades into the start-lock.

NOTE: IT IS NOT PERMISSIBLE TO BRING THE BLADES OUT OF FEATHERING POSITION WITH A BLADE PADDLE, BECAUSE THE COMPOSITE BLADES COULD BE DAMAGED.

5.11 Install spinner on support plates, observe mating marks. Torque screws with plastic washers 34 - 44 inlb. Check runout of the dome. Max. 0,08 inch permissible.

5.12 INSTALLATION OF THE BETATUBE (FOR GARRETT APPLICATION ONLY)

Warning: Do not shear off material of the O-ring no. A+B (see fig. II, page 15) during installation of the beta tube. This will cause oil leakage.

5.13 WARNING: CONNECT ELECTRICAL PROPELLER DE-ICE SYSTEM.

Test runs with electrical de-icing already installed on the propeller are only permitted with a mounted spinner, otherwise the wire harness will be damaged. Before the run up, clean the ground to avoid damage of the propeller blade and de-ice boots (i.e. stone nicks). Propeller de-icing and Engine/Elevator anti-icing must be switched off on ground when OAT or TAT is warmer than 5°C. Propeller de-icing must be switched off on the ground when the applicable propeller is stationary.

5.14 CARRY OUT A FUNCTIONAL CHECK / PROPELLER CHECK

Engine and propeller manufacturers recommend not to use high engine speed on ground, because it can result in an excessive engine temperature and blade damage. Observe the airplane flight manual.

For TPE-331-() engines start the engine only with the blades in the startlock.

5.15 ADJUSTING

Mechanical low and high pitch stops, reverse and feathering, are adjusted during manufacture, according to the requirement of the aircraft/engine combination. Low pitch can only be adjusted via the beta-setup. Feathering can be adjusted by turning the check nuts. The pitch stop reverse cannot be changed in the field.

On the MTV-27-1-N-C-F-J, the low pitch stop cannot be changed in the field.

**5.16 FOR THE GARRETT / HONEYWELL APPLICATION**

Set the low pitch blade angle with the unfeathering pump and due to turning the beta tube in or out.. Refer to figure II, page 16.

Turning IN → lower pitch

Turning OUT → higher pitch

The beta tube is secured by the screw AN3H-13A and the stop nut MS 20364-1032A. Put on both sides washer AN 960-10.

Finally bring the blades into the start lock.

5.17 After the ground runs, check for oil leaks, blade shake and condition of the de-ice system.

5.18 Perform check flight in accordance with the description in the flight manual. In case no instructions from the flight manual are available, carry out general handling check during the next flight.

5.19 OPERATION

Propeller, governor and beta-system are selected as a result of tests. The governor must allow constant speed as well as reverse and feathering.

For MTV-27-1-N-C-F-J no reverse option is possible.

At all power and rpm settings the rpm must be automatically controlled and changed in the entire speed range. Range as mentioned in the flight manual.

In case of failure of oil pressure, the propeller automatically goes into feathering.

Remark:

Move power lever and rpm lever always slowly to avoid overspeed. The lightweight blades result in faster reaction of rpm and pitch change than usual variable pitch propellers with metal blades.

5.20 PRE-FLIGHT CHECK

Before Take-off, check the propeller pitch change according to the Aircraft Flight Manual. If it is possible and allowed push the pitch change two times to bleed the system.

5.21 IN FLIGHT

Power as well as rpm setting according to the Aircraft Flight Manual.

5.22 FEATHERING

All mentioned propeller have feathering which must be reached in every flight condition. The TPE-331-() engines achieve feathering only in case of emergency, because these engines have a separate feathering-valve and not the governors, as usual.

**5.23 REVERSE MODUS**

For these propellers reverse is initiated by pulling back the power lever over the flight idle gate. The power lever controls the beta-valve on the governor. By pulling the power lever further back, the beta valve moves. Because of that the rpm and the negative blade angle increase and negative thrust is produced. At the same time a yellow lamp inside the cockpit must illuminate which informs the pilots that the propeller is in beta mode (reverse). Because of alternate designs from aircraft manufacturers, there are different safety provisions possible to avoid unintended reverse during flight. The Aircraft Flight Manual as well as the Maintenance Manual describe the systems more detailed.

NOTE: THE MTV-27-1-N-C-F-J HAS NO REVERSE FUNCTION.

5.24 PROPELLER DE-ICING

Propeller de-icing and Engine/Elevator anti-icing must be switched off on ground when OAT or TAT is warmer than 5°C. Propeller de-icing must be switched off on the ground when the applicable propeller is stationary. Check ammeter reading after switching on the electrical propeller de-ice system when the engine is running.

5.25 STOP NUTS

Stopnuts with washers should be tightened crosswise with equal force.

Mounting Torques:

- a) For dry free-moving threads only:
1 /2" - 20 UNF stopnuts 60 - 85 ftlb

For lubricated torques only:
9/16" - 18 UNF stopnuts 68 - 72 ftlb
Generously apply anti-seize thread compound per MIL-T-83483
(e.g. Loctite® Moly 50™) only, to threads of studs & nuts; also to faces of nuts & washers.



6. INSPECTIONS

6.1 DAILY INSPECTION (CAN BE CONDUCTED BY THE PILOT)

Before each flight inspect the condition of the blades and spinner. Blade shake is allowed up to 1/8 inch and a blade angle play of 2° is acceptable.

No critical cracks in the blades (see 6.2). Metal erosion sheath may not be loose. PU-strip proper and existing. If not, replace within the next 2 hours after last inspection. No oil leaks.

6.1.1 Grease Leackages

NOTE:

THE FIRST RUN-UP OF A NEW OR OVERHAULED PROPELLER ASSEMBLY MAY LEAVE GREASE ON THE BLADES AND INNER SURFACE OF THE SPINNER DOME. THIS IS NORMAL AND DOES NOT MEAN THAT IT WILL BE A CONTINUING GREASE LEAKAGE.

Condition	Resolution
Minor film of grease (sweating), but not present on Blades, Hub, etc.	Normal operation, monitor only. Clean with mild solvent as required.
Grease Leakage spraying 18 cm (7 inches) or less from blade root (when first detected).	First occurrence, clean blade(s), hub and spinner with mild solvent as required and monitor for 5 flight hours.
Grease Leakage spraying 18 cm (7 inches) or less from blade root when continuing past initial 5 hours of monitoring.	Clean blade(s), hub and spinner with mild solvent as required and monitor for an additional 20 flight hours.
Grease Leakage spraying 18 cm (7 inches) or less from blade root when continuing past additional 20 hours of monitoring.	Within 5 flight hours, remove prop and send to authorized shop.
Grease Leakage spraying greater than 18 cm (7 inches) from the blade root when first detected.	Take photos and send to MT Techsupport for instructions to proceed. 5 flight hours are allowed after initial detection of grease leakages beyond 18 cm (7 inches) from the blade root.

IN CASE OF DOUBT, CONTACT MANUFACTURER / MT TECHSUPPORT FOR FURTHER ACTION!

6.2 INSPECTION

- According to Aircraft Maintenance Manual or
- Not later than 400 flight hours or annually, if no schedule available!

6.2.1 Remove spinner and check for cracks. Check blade shake, max. 1/8 inch.

The blade shake must be checked IN and OPPOSITE the direction of rotation. Measure blade shake 4 inch from blade tip at the trailing edge.

NOTE:

DO NOT MEASURE IN FLIGHT DIRECTION, AS THE BLADE BENDING WILL ALSO BE MEASURED.

Check blade angle play, max. 2°. If the check shows values above these tolerances, contact the service department of MT-Propeller. Inspect outside condition of the hub and parts for cracks, corrosion, deterioration. Inspect check nut feather stop for tightness. Check all safety means to be intact. Check front and rear spinner plate for cracks and fixing. Inspect blade root and hub for oil and grease leaks. Check position of counterweights. Check electric de-ice boots and wire harness for connection and condition. Check brushes and slip ring for condition.



For feathering propellers check for the start lock- and guide rod wear to ensure correct functioning.

Attention:

Make sure that the start lock moving parts are free from oil, grease and dirt.

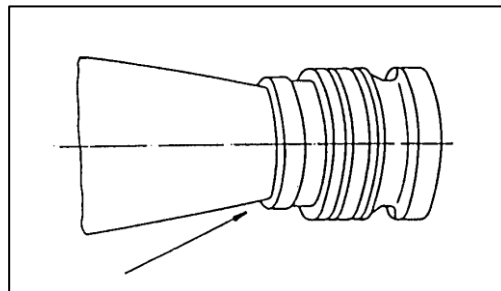
Clean with a degreaser if needed!

If the start lock is contaminated, it may be sluggish and damage the guide rod.

Check **Composite blades**, for cracks in the fiberglass cover and blade erosion sheath. There are only certain cracks allowed.

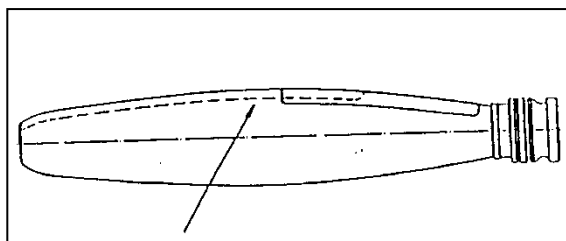
Cracks along the leading edge and on the beginning of the erosion sheath area are allowed as long as the erosion sheath is not loose. Cracks in the painted surface are allowed as long as no moisture can enter the blade core. Blisters or delaminations up to 1 square inch are permissible. In case of questionable conditions please contact the service department of MT-Propeller.

Illustrations of possible cracks in the blade



Check that the silicone, sealing the blade to the blade ferrule, is not damaged. If a damage is obvious, **REPAIR IMMEDIATELY** that no moisture can enter into blade body and blade ferrule.

Perform visual inspection in case of notches, dents, nicks or other damages to the blade body (for example stone nicks). If no cracks exist, fill void with an appropriate Epoxy resin (5 min. Epoxy). The aerodynamic of the airfoil must not be destroyed. Afterwards sand the filled spot with sandpaper. Apply a lacquer layer to protect the repaired spot against moisture. Whenever performing pre-flight inspection, check this area carefully for possible cracks. During the next repair/overhaul at the manufacturer or service station this area will be inspected and repaired by a competent expert.

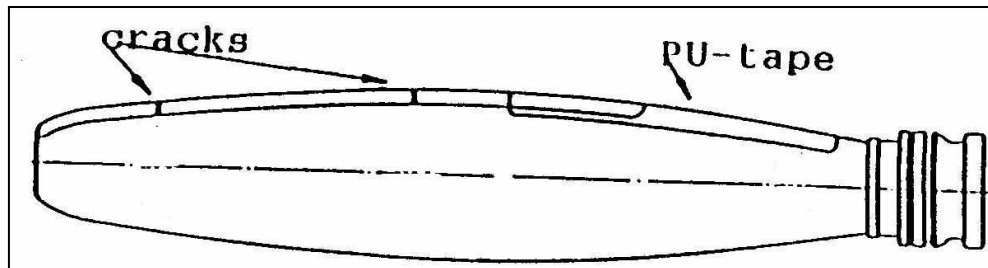




Possible cracks along the metal erosion sheath. If there is an indication that the erosion sheath gets loose on the transition area to the blade, inspect it according to item 6.6.

Cracked erosion sheath requires immediate repair.

If chordwise cracks appear, return propeller to manufacturer. Replace PU-tape as soon as possible, if loose or damaged.



6.2.2 Possible Damage along Erosion Sheath

6.2.2.1 Circular Dents (more than 0,24 inch x 0,24 inch / 6 mm x 6 mm).

If within 2 inches (51 mm) no other dents of that size are visible, the dent size may exceed the original maximum size by 0,12 inch (3 mm) to 0,36 inch x 0,36 inch (9 mm x 9 mm).

If within 3 inches (76 mm) no other dents of that size are visible. The dent size may exceed original maximum size by 0,197 inch (5 mm) to a maximum of 0,433 inch x 0,433 inch (11 mm x 11 mm).

If dent is bigger, do not repair. Change erosion sheath!

6.2.2.2 Pointed dents (more than 0,24 inch x 0,24 inch (6 mm x 6 mm).

If within 2 inches (51 mm) no other dents of that size are visible, the dent size may exceed the original maximum size by 0,12 inch (3 mm) to 0,36 inch x 0,36 inch (9 mm x 9 mm).

If within 3 inches (76 mm) no other dents of that size are visible. The dent size may exceed original maximum size by 0,197 inch (5 mm) to a maximum of 0,433 inch x 0,433 inch (11 mm x 11 mm).

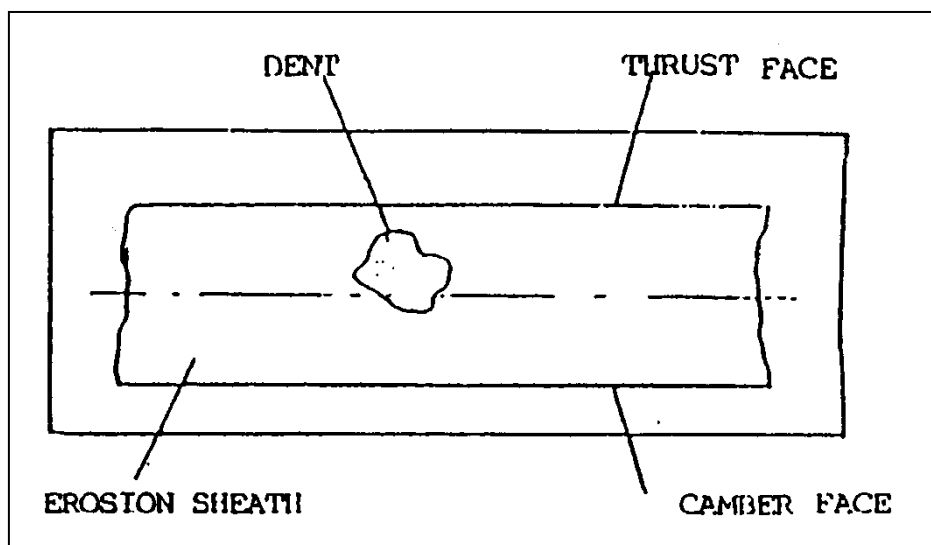
If dent is bigger, do not repair. Change erosion sheath!



- 6.2.2.3 Cracks (no cracks allowed in the erosion sheath, otherwise change erosion sheath)
- 6.2.2.4 Hollow and debonded spots (max. 0,39 square inch, no two spots may occur within 5,5 inch of each other, otherwise blade must be repaired)
- 6.2.2.5 Erosion
- 6.2.2.6 Lightning strike

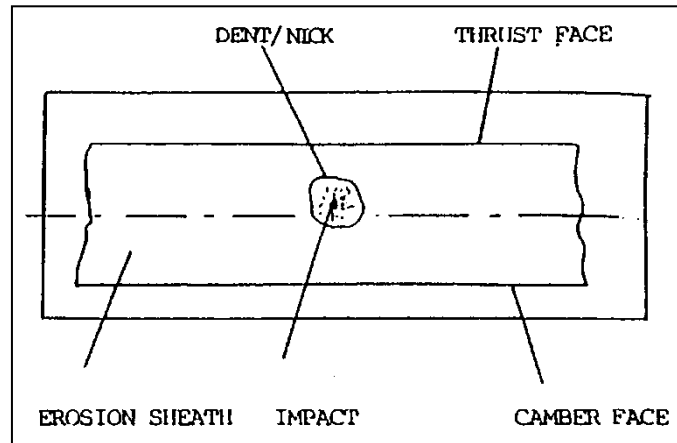
6.3 In case of any impact as mentioned under item 6.2.3.1 (Circular Dents), check whether it penetrates through the erosion sheath. If not, fill dent with Epoxy and grind off until there is a smooth surface.

NOTE: EPOXY MAY BE APPLIED FOR COSMETIC REASONS BUT NOT "MUST BE DONE". CHECK THIS AREA CAREFULLY FOR POSSIBLE CRACKS WHENEVER PERFORMING PRE-FLIGHT INSPECTION. EROSION SHEATH MAY REMAIN UNTIL NEXT REPAIR/OVERHAUL WILL BE DONE.

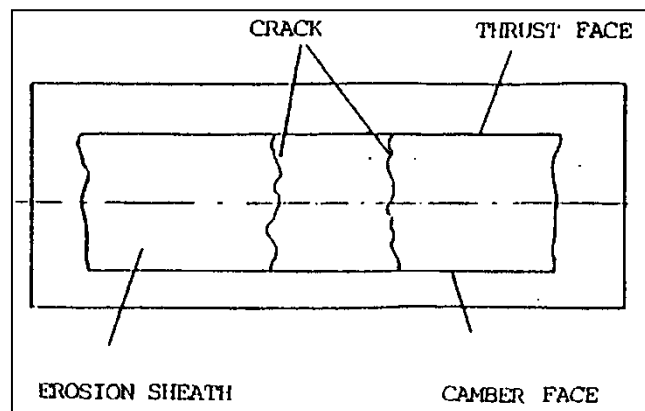


**6.4**

In case of impacts in the erosion sheath (as mentioned under item 6.2.3.2 the sheath may possibly be penetrated. If not, proceed as described under item 6.3. If yes, check erosion sheath for possible cracks. If there are no cracks, the dent must be filled with Epoxy so that no moisture can enter into the blade body. Check this area carefully for possible cracks whenever performing pre-flight inspection. The erosion sheath must be replaced as soon as possible.

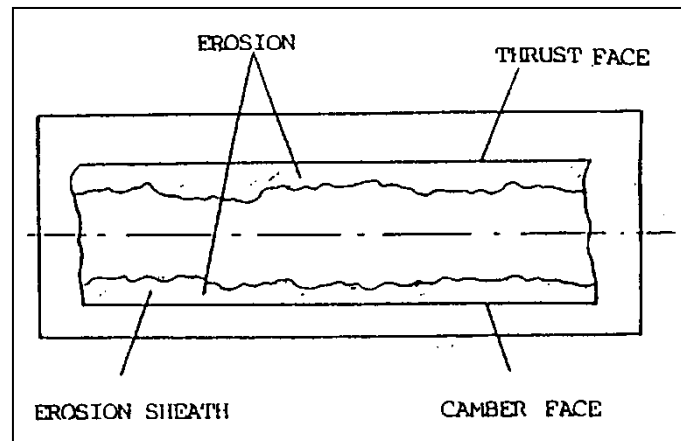
**6.5**

If there are any cracks (as mentioned under item 6.2.3.3), the erosion sheath must be replaced as soon as possible. The propeller is to be returned to the manufacturer or to an authorized service station.





- 6.6** If any hollow and debonded spots exist (as mentioned under item 6.2.3.4), mark them. Whenever performing pre-flight inspection, monitor whether there are further delamination and/or whether the already existing delamination becomes worse. The inspection can be executed by using an appropriate coin (Tab-Test). The hollow and debonded spots must not exceed 30 % of the surface of the erosion sheath at all (lengthwise only 1 inch allowed). Otherwise the blade is to be sent to the manufacturer or to an authorized service station for repair as soon as possible. Check secure fixing of the erosion sheath in any case every time before flight.



- 6.7** The erosion mentioned under item 6.2.3.5, which erodes the lacquer layer from the erosion sheath, occurs due to the peripheral speed of the blade and is normal. However, always take care that the erosion never becomes so deep that the FRP-coat is damaged as there is a possibility that moisture may enter into the blade body. In this case the blade must be repaired/overhauled immediately. Return the blades also, if the erosion sheath is eroded through. If the PU-protection tape is damaged, replace it immediately.

6.8 BLISTERS AND DELAMINATIONS

Are blisters or delaminations visible, mark them and check them periodically. Blisters from sap (resin) shall be opened to release the material. Fill void with 5-min Epoxy and sand. Larger delaminations shall be opened and the material be removed. Such areas must be covered with new fiber glass laminate. Damage on the trailing edge can be repaired the same way.

6.9 CRUNCHED TRAILING EDGES

Crunched trailing edges can be repaired by using 5 minute Epoxy if the damage is not deeper than 5 mm (0,20 inches) and not wider than 15 mm (0,60 inches).

Most important is, that no moisture can enter the load carrying blade body.

If damage is bigger, contact manufacturer!

**6.10 BLADE ROOT SHRINKAGE**

In rare cases blade root shrinkage may occur. In such a case the composite layer may create some ripples which are only of cosmetic nature and those ripples will be corrected during next overhaul (OH).

6.11 LIGHTNING STRIKE

If a blade has an indication of lightning strike, check the entire blade and erosion sheath per item 6.3 and 6.6. Also send a report to the manufacturer (MT-Propeller).

6.12 DE-ICE BOOTS

Installed De-Ice Boots must be checked for their correct bonding. In case a delamination is found (maximal allowed are 8 mm x 8 mm / 0,31 inch x 0,31 inch), repair with glue (i.e. Loctite 401).

After repair seal area with sealer (i.e. 3M Scotch Seal 800-AF) to avoid any moisture entering below the boot.

Finally overpaint repaired area with some black varnish.

6.13 OVERHAUL

The time between overhauls is expressed in hours flown and calendar months since manufacture or overhaul. The figures are presented in Service Bulletin No. 1.- (), latest issue. They are also shown in the Propeller Logbook. In any case, a calendar time inspection must be performed after a maximum of 72 months from installation, if no more than 24 months have passed since manufacturing overhaul when properly stored. This means that calendar time TBO can be max. 96 months. The extend of the overhaul and the replacement of life-limited parts is ruled in the applicable service manual, see item 1.0.2.

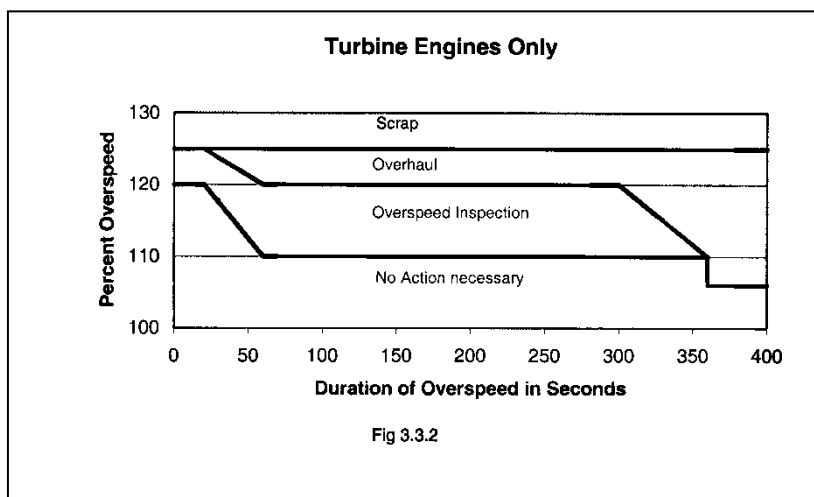
Attention:

In case of a blade damage by a foreign object an overhaul is always required in case that the blade damage is beyond the limitation of an in-field repair.

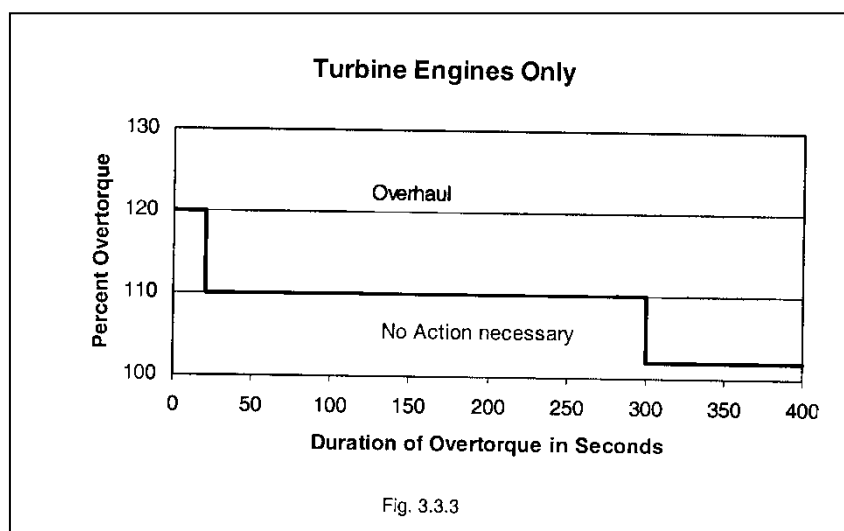


6.14 OVERSPEED / OVERTORQUE

When a propeller installed on a turbine engine has an over speed event, refer to the Turbine Engine Overspeed Limits (Fig 3.3.2) to determine the corrective action to be taken.



When a propeller installed on a turbine engine has an over torque event, refer to the Turbine Engine Overtorque Limits (Fig. 3.3.3) to determine the corrective action to be taken.





For engine mounted accessories (for example, governors, pumps, and propeller control units) manufactured by MT-Propeller, any over speed at a severity level and /or duration sufficient to require at minimum a search inspection for the propeller, will require the accessory to be disassembled and inspected in accordance with the applicable maintenance manual.

Regardless of the degree of damage, make a log book entry to document the over speed event.

6.15 CORRECTIVE ACTION

The corrective action is based on the severity and the duration of an overspeed or overtorque for a single event.

No Action Necessary

Where no action is necessary, no maintenance is necessary other than to verify that the overspeed was not caused by a mechanical problem.

6.16 OVERSPEED INSPECTION

An over speed inspection requires the disassembly of the propeller in accordance with the appropriate propeller overhaul manual and performance of the following inspections:

- **General:**
Visually inspect for signs of abnormal wear and/or damage. Evidence of wear and/or damage should be further evaluated using the inspection criteria from the appropriate propeller or blade overhaul manual. Special attention must be given to blade retention components.
- **Aluminum Hubs:**
Visually inspect the blade retention area of the blade socket.
- **Aluminum Blades:**
Visually inspect the blade retention radius for evidence of damage or premature wear. This requires removal of the bearing races.
- **Composite Blades:**
Perform a thorough visual and coin tap inspection of the exposed portion (de-ice boot removal not required) of each blade including the stainless steel leading edge. Perform a torque test of the lag screws.

6.17 OVERHAUL

When an overhaul is the corrective action for an over speed or an over torque, the Propeller must be overhauled in accordance with the appropriate overhaul manual.

6.18 SCRAP

When the corrective action requires scrapping the propeller, the propeller must be removed from service.



7. MAINTENANCE

7.1 There is no special maintenance schedule for this propellers beyond the usual inspections as per item 6. For the repair of minor damages in the blade surface and edges, automotive material such as PU or acryl paint and Epoxy resin can be used.

7.2 The surface finish is made with PU lacquer or acryl lacquer. This material is resistant against nearly all solvents. The blades can be cleaned with normal car cleaners and polish. It is important to avoid moisture penetrating into the wooden core. If necessary, please consult an aircraft inspect or for final decision concerning repair.

If the repair is made locally, please observe the curing time of resin and paint systems.

7.3 There are no frequent maintenance works required on the hub because all moving parts are inside the hub and not exposed to the environment. Blade bearings and pitch change mechanism are filled with special lubricants and there is no need to refill between overhauls. A corrosion protection of the hub with thinned engine oil or anticorrosion spray is recommended.

7.4 Repair of spinner parts is not permissible. Cracked spinner domes, filler plates and backplates are to be replaced by airworthy parts.

7.5 Broken tips and damaged composite blades can be repaired by the manufacturer if a minimum of 85 % of the blade remains without cracks. Damages on the trailing edge can be repaired because the epoxy cover can be replaced and every time a new erosion sheet can be installed.

In case of a ground strike the hub is still airworthy if the crack- and dimensional inspection do not show any signs of a damage.

In case of doubt send the affected hub as well as the broken blades to the manufacturer for evaluation.



7.6 DYNAMIC BALANCE

7.6.1 Overview

7.6.1.1 Dynamic balance is accomplished by using an accurate means of measuring the amount and location of the dynamic imbalance. After such a undertake the remaining imbalance should be below 0,2 ips.

7.6.1.2 Follow the instructions from the equipment manufacturers for dynamic balance.

7.6.1.3 If the dynamic imbalance is bigger than 1,2 ips, the propeller must be removed and statically re-balanced.

7.6.2 INSPECTION PROCEDURES PRIOR TO BALANCING

7.6.2.1 Visually inspect the propeller assembly after it has been reinstalled on the aircraft prior to dynamic balancing.

NOTE:

THE FIRST RUN-UP OF A NEW OR OVERHAULED PROPELLER ASSEMBLY MAY LEAVE GREASE ON THE BLADES AND INNER SURFACE OF THE SPINNER DOME. THIS IS NORMAL AND DOES NOT MEAN THAT IT WILL BE A CONTINUING GREASE LEAKAGE.

Condition	Resolution
Minor film of grease (sweating), but not present on Blades, Hub, etc.	Normal operation, monitor only. Clean with mild solvent as required.
Grease Leakage spraying 18 cm (7 inches) or less from blade root (when first detected).	First occurrence, clean blade(s), hub and spinner with mild solvent as required and monitor for 5 flight hours.
Grease Leakage spraying 18 cm (7 inches) or less from blade root when continuing past initial 5 hours of monitoring.	Clean blade(s), hub and spinner with mild solvent as required and monitor for an additional 20 flight hours.
Grease Leakage spraying 18 cm (7 inches) or less from blade root when continuing past additional 20 hours of monitoring.	Within 5 flight hours, remove prop and send to authorized shop.
Grease Leakage spraying greater than 18 cm (7 inches) from the blade root when first detected.	Take photos and send to MT Techsupport for instructions to proceed. 5 flight hours are allowed after initial detection of grease leakages beyond 18 cm (7 inches) from the blade root.

IN CASE OF DOUBT, CONTACT MANUFACTURER / MT TECHSUPPORT FOR FURTHER ACTION!

7.6.2.2 Prior to dynamic balance record the number and location of all balance weights from the static balance.

7.6.2.3 It is recommended that placement of balance weights on aluminum spinner bulkheads which have not been previously drilled be placed in a radial location.

7.6.2.4 The radial location should be outboard of the slip ring and inboard of the bend at which point the bulkhead creates a flange to attach the spinner dome.

7.6.2.5 Drilling holes for use with the AN3-() type bolts with self-locking nuts is acceptable.

NOTE:

CHADWICK-HELMUTH MANUAL AW-9511-2, „THE SMOOTH PROPELLER,, SPECIFIES SEVERAL GENERIC BULKHEAD REWORK PROCEDURES.



- 7.6.2.6 All hole/balance weight locations must take into consideration, and must avoid, any possibility of interfering with the adjacent airframe, de-ice and engine components.

Attention:

In case that anchor nuts are installed on the backplate to mount the dynamic balance weights, make sure that the dynamic balance fixing screws do not extend the anchor nuts by more than 1 turn.

Otherwise the de-icing cables will be damaged or the counterweight can touch the mounting screw.

7.6.3 PLACEMENT OF BALANCE WEIGHTS FOR DYNAMIC BALANCE

- 7.6.3.1 The preferred method of attachment of dynamic balance weights is to add the weights to the spinner bulkhead. The static balancing weights are installed on the spinner front plate, if applicable.
- 7.6.3.2 Subsequent removal of the dynamic balance weights, if they exist, will return the propeller to its original static balance condition. The static balance weights are only allowed to remove exceptionally.
- 7.6.3.3 Use only stainless washers or plated steel washers as dynamic balance weights on the spinner bulkhead.
- 7.6.3.4 Do not exceed maximum weight per location of 70 g at a propeller speed of 1543 rpm or 55 g at propeller speed of 2000 rpm.
- 7.6.3.5 Weights are to be installed using aircraft quality 10-32 inch screws bolts.
- 7.6.3.6 Balance weight screws attached to the spinner bulkheads must protrude through the self-locking nuts a minimum of one thread and a maximum of four threads.
- 7.6.3.7 All propellers which have been dynamically balanced must install a decal on blade no. 1. This will alert repair station personnel that the existing balance weight configuration may not be correct for static balance.
- 7.6.3.8 Record number and location of dynamic balance weights, and static balance weights if they have been reconfigured, in the Propeller Logbook.



8. TROUBLE SHOOTING

8.1 BLADE SHAKE

8.1.1 Fore and aft movement

Cause: Blade bearing loose

Remedy: If more than 3 mm, return propeller to the factory or any approved repair station to correct the pre-load of the blade retention bearing.

8.1.2 Blade angle play

Cause: Blade bearing loose by seating and/or increased play by wear in the pitch change mechanism (pitch change pin, pitch change block)

Remedy: If more than 2°, return propeller to the factory or any approved repair station.

8.2 SLUGGISH RPM CHANGE

Cause: 1. Oil is cold
2. Excessive friction

Remedy: 1. Run the turbine until the green arc of the oil temperature is reached.
2. Move blades by turning them with hands within the angular play. If excessive friction exists, the blade retention system has to be inspected, contact factory.

8.3 SURGING RPM

Cause: 1. Sludge deposit
2. Wrong speeder spring in the governor
3. Wrong pitch stops in the propeller
4. Abrupt movement of propeller or throttle control
5. Instrumental error

Remedy: 1. Clean oil tubes in the turbine in the propeller piston and eventually in the governor (only possible at the manufacturer's).
2. Check that the governor part number corresponds to the aircraft data sheet. If the rpm does not stabilize after 5 periods this is an indication for a wrong speeder spring, contact factory.
3. Compare pitch values to those of the data sheet. Note static rotational speed.
4. Move the controls carefully and slowly.
5. Check tachometer and drive.



8.4 RPM VARIATIONS BETWEEN ASCEND, CRUISE AND DESCEND ALTHOUGH HAVING IDENTICAL PROPELLER SETTING

Up to ± 50 rpm normal condition. If more:

- Cause:
1. Excessive friction in the propeller
 2. Excessive friction in the governor
 3. Defect tachometer

- Remedy:
1. Contact manufacturer.
 2. Contact manufacturer.
 3. Replace/repair instrument.

8.5 RPM DECREASE DURING NORMAL OPERATION WITHOUT CHANGE OF PROPELLER LEVER POSITION

- Cause:
1. Oil leakage or hot oil
 2. Worn oil transfer system causes a increase in blade angle of attack.
 3. Failure of governor speeder spring
 4. Governor drive failure.

- Remedy:
1. Check for oil leaks, replace gaskets, decrease oil temperature with higher airspeeds.
 2. If the system works with cold oil and fails at high oil temperature, this will indicate high leakage in the oil transfer system on the propeller shaft. Repair turbine.
 3. Contact manufacturer.
 4. Check governor drive and governor on the test bench.

8.6 RPM INCREASE DURING NORMAL OPERATION WITHOUT CHANGE OF PROPELLER LEVER POSITION

- Cause:
1. Sticking pilot valve in governor
 2. Control inoperative or broken.

- Remedy:
1. Check governor on the test bench.
 2. Check free movement, connection and positive stop contact.



8.7 EXTREMELY SLOW PITCH CHANGE OR NO PITCH CHANGE ON GROUND (RPM CHANGES WITH AIRSPEED LIKE A FIXED PITCH PROPELLER)

- Cause:
1. Blocked oil line.
 2. Sludge deposit in propeller piston.
 3. Damaged pitch change mechanism.
 4. Corrosion in the blade bearings.

- Remedy:
1. Check turbine.
 2. Clean propeller and crankshaft.

Concerning 1 and 2:

This behavior does not appear at once and gets worse after some time. It should be observed at the preflight check.

3. Contact manufacturer.
This error may appear suddenly.
4. Repair propeller.

8.8 OIL LEAKAGE (VISIBLE OUTSIDE OR HIDDEN INSIDE)

- Cause:
- Damaged seals

- Remedy:
- Replace gaskets or repair propeller.

8.9 ROUGH RUNNING TURBINE, POSSIBLY IN LIMITED RPM RANGE ONLY

- Cause:
1. Bad static balance.
 2. Bad dynamic balance.
 3. Operation in restricted rpm range.

- Remedy:
1. Rebalance statically, mount balance weights to forward spinner bulkhead.
 2. Rebalance dynamically. Install balance weights to rear spinner bulkhead. See item 7.6.
 3. Refer to airplane flight manual. Check rpm gauge for correct reading. Repair or replace if necessary.

**8.10 SLOW REVERSING OR NO REVERSING**

If reverse is not possible, the governor and the mechanical linkage between the rotating propeller and the turbine must be inspected. Relief-Valve pressure is too low, or the internal leakage of the oil transfer system is too high.

NOTE: THE MTV-27-1-N-C-F-J HAS NO REVERSE FUNCTION.

8.11 SLOW FEATHERING

If more than 10 sec. are needed for full feathering, there is one of the following problems: sticking blades or pitch change mechanism, control too long or wrong adjusted governor. If no discrepancies are found during inspection, check governor on a test bench, at TPE-331-() engines, check the feathering valve.



9. SHIPPING AND STORAGE

- 9.1** For any shipment of the propeller use original container. If this is impossible it will be very important to fix the propeller at the blades and the hub, if necessary, in a manner that avoids damage.

In case of returning the propeller it is furthermore recommended to return all accessories and parts together with the propeller. They will also be inspected and not considered to be missing.

- 9.2** If the propeller is stored for a longer period of time, preferably use the original container or an equivalent one. Storage only in a controlled environment (temperature - 5°F to 95°F, rel. humidity 10 % to 75 %). Avoid extreme temperature/humidity differences or cycles. All metal surfaces should have anti-corrosion protection which is easy to remove. There is no need to protect the blades because its lacquer is sufficient.

- 9.3** The TBO starts with the installation on the aircraft.
However, if the installation is later than 24 months after new assembly or overhaul and proper storage provided, the TBO automatically starts after this 24 months, up to maximal 96 months calendar time.

- 9.4** If the propeller is stored for longer than 24 months it can be disassembled before installing to the aircraft and all seals have to be replaced. This will bring calendar time TBO back to zero.

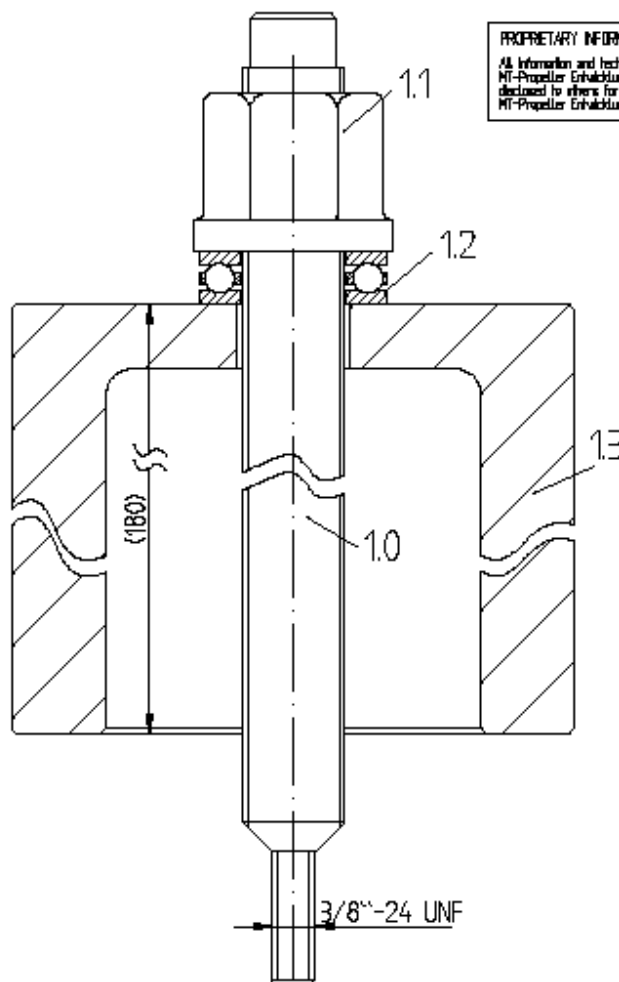
- 9.5** Long-term storage could require additional preservation. All standard anti-corrosive preservation oils may be used if they do not affect the seals. Only metal parts have to be protected. The wood-composite blades need no special protection but mechanical damage has to be avoided, so that no moisture may enter the wooden blade core.

- 9.6** If the propeller is stored or transported in corrosive environment such as salt water or fog, it is recommendable to cover the visible outside surfaces of the metal parts with a thin film of light engine oil.

- 9.7** If the propeller is delivered in a wooden shipping box, the shipping box must be opened after receipt. By opening the shipping box it is ensured that the chemically treated wood of the shipping box does not create any corrosion on the metal parts of the propeller due to chemicals used to treat the wooden shipping box.

10. SPECIAL TOOLS (DRAWINGS)

T-735-D: Puller PT6A



PROPRIETARY INFORMATION

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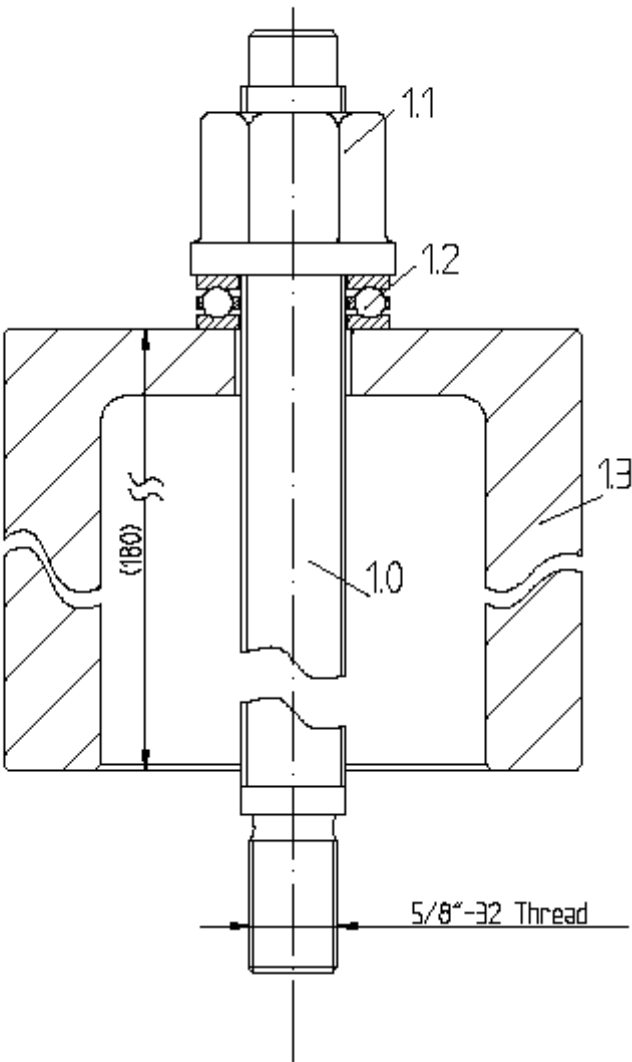
No.	Quantity	Description	Drawing No.
10	1	Thread spindle	T-375-1
11	1	Nut M20	Y-117-9
12	1	Ball bearing	Y-117
13	1	Distance piece	T-752

MT-Propeller Entwicklung GmbH Flugplatzstrasse 1 D-94348 Atting				Freimess toleranzen:		Gewicht:		Maßstab:		PT-6 Application			
								MTV-()					
				1998	Datum	Name		Puller					
				Bearb.	02.11.	Grum							
				Gepr.									
				Norm									
D	T-752	26.01.11	A.S					T-375-D					
C	M20 war M12/DW	28.05.09	E.D	Werkstoff:								Blatt	
B	Div.	23.02.06	F.G										
A	Div.	20.01.99	F.G										
Zust.	Änderung	Datum	Name	Rechteil:				Bl					



SPECIAL TOOLS

T-751-1: Startlock Puller TPE-331-14GHR



No.	Quantity	Description	Drawing No.
1.0	1	Thread spindle	T-420-1
1.1	1	Nut M20	Y-117-9
1.2	1	Ball bearing	Y-117
1.3	1	Distance piece	T-752

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MT-Propeller Entwicklung GmbH Flugplatzstrasse 1 D-94348 Aiting				Freinastoleranzen:		Gewicht:	Maßstab: 1:1	Jetstream 41
				± 0,2 mm			MTV-27-1-N-C-F-R(G)-J	
				2011	Datum	Name	Puller	
				Bearb.	24.01	Seperant		
				Gepr.				
				Norm				
				Werkstoff:			T-751-1	
Zust.	Änderung	Datum	Name	Rehtell:				Blatt
								Bl.



11. AIRWORTHINESS LIMITATIONS SECTION (ALS)

No Airworthiness Limitations!

This Airworthiness Limitations Section (ALS) is EASA approved in accordance with Part 21A.31(a)(3) and CS-P40(b) and 14 CFR Part 35.4 (A35.4) and JAR-P20(e). Any change to mandatory replacement times, inspection intervals and related procedures contained in this ALS must also be approved.

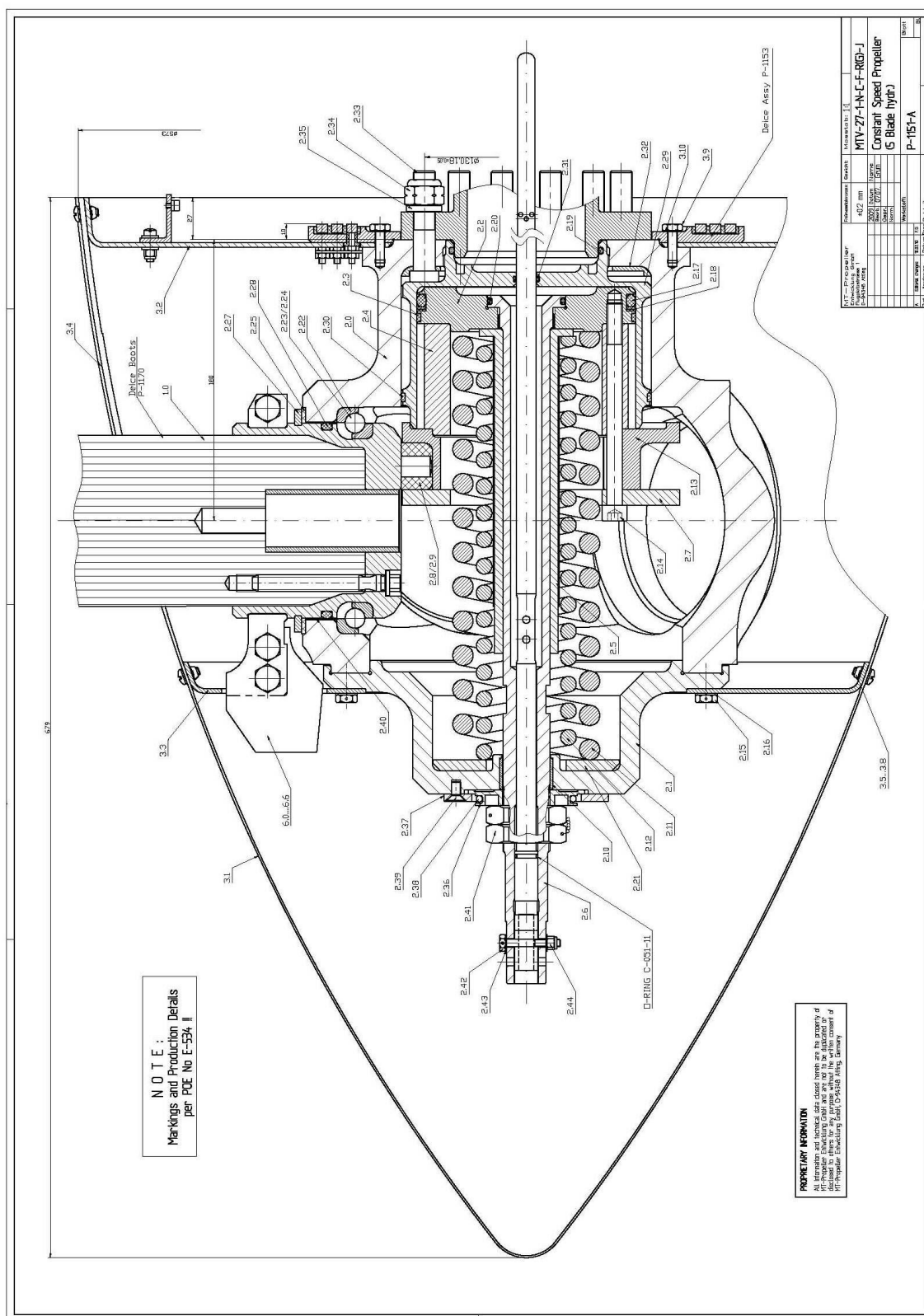
The Airworthiness Limitations Section is FAA approved and specifies maintenance required under §§ 43.16 and 91.403 of the 14 CFR unless an alternative program has been FAA approved.

Rev. No.	Description of Revision



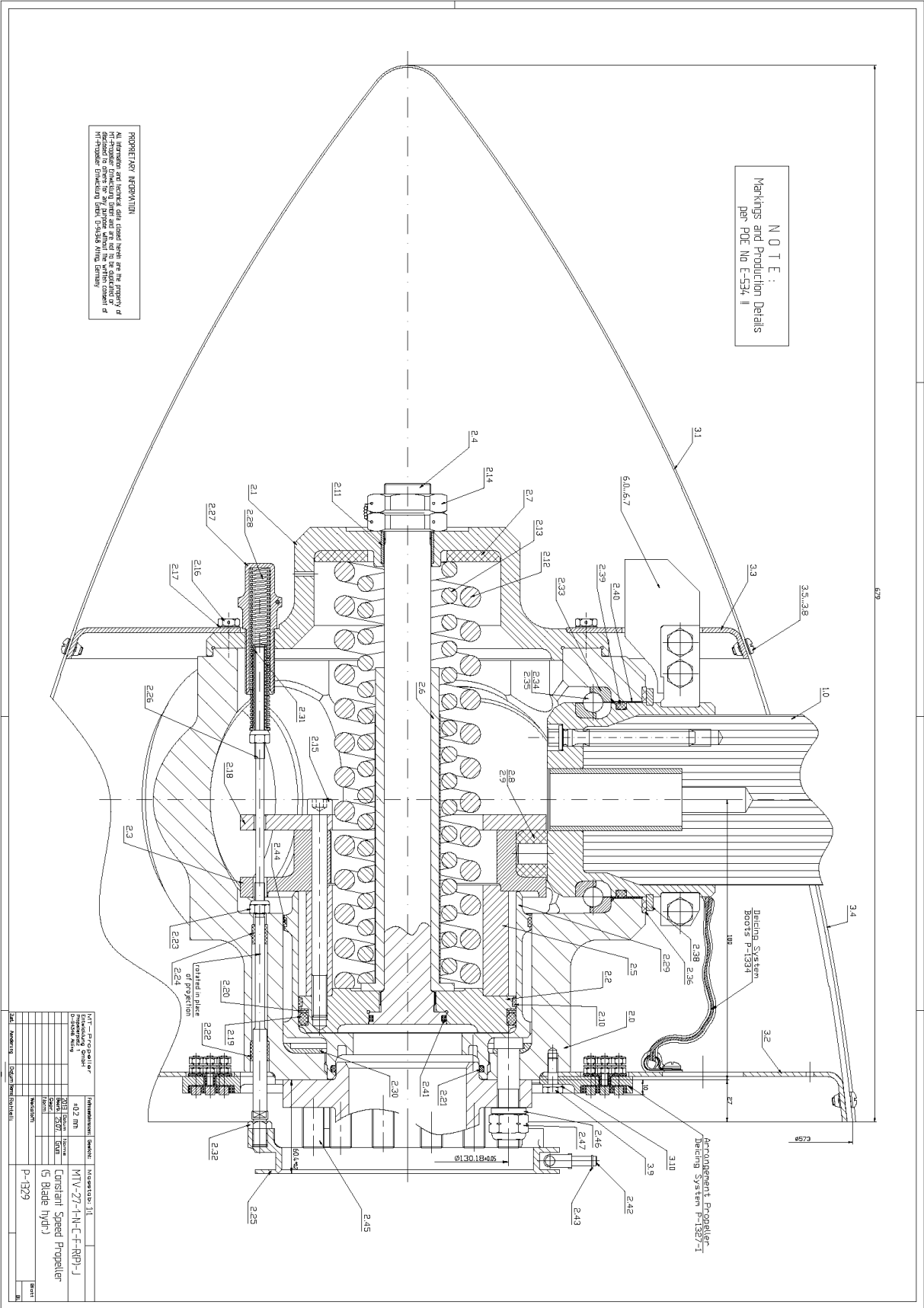
12. PROPELLER DRAWINGS

Propeller Drawing P-1151-A: MTV-27-1-N-C-F-R(G)-J





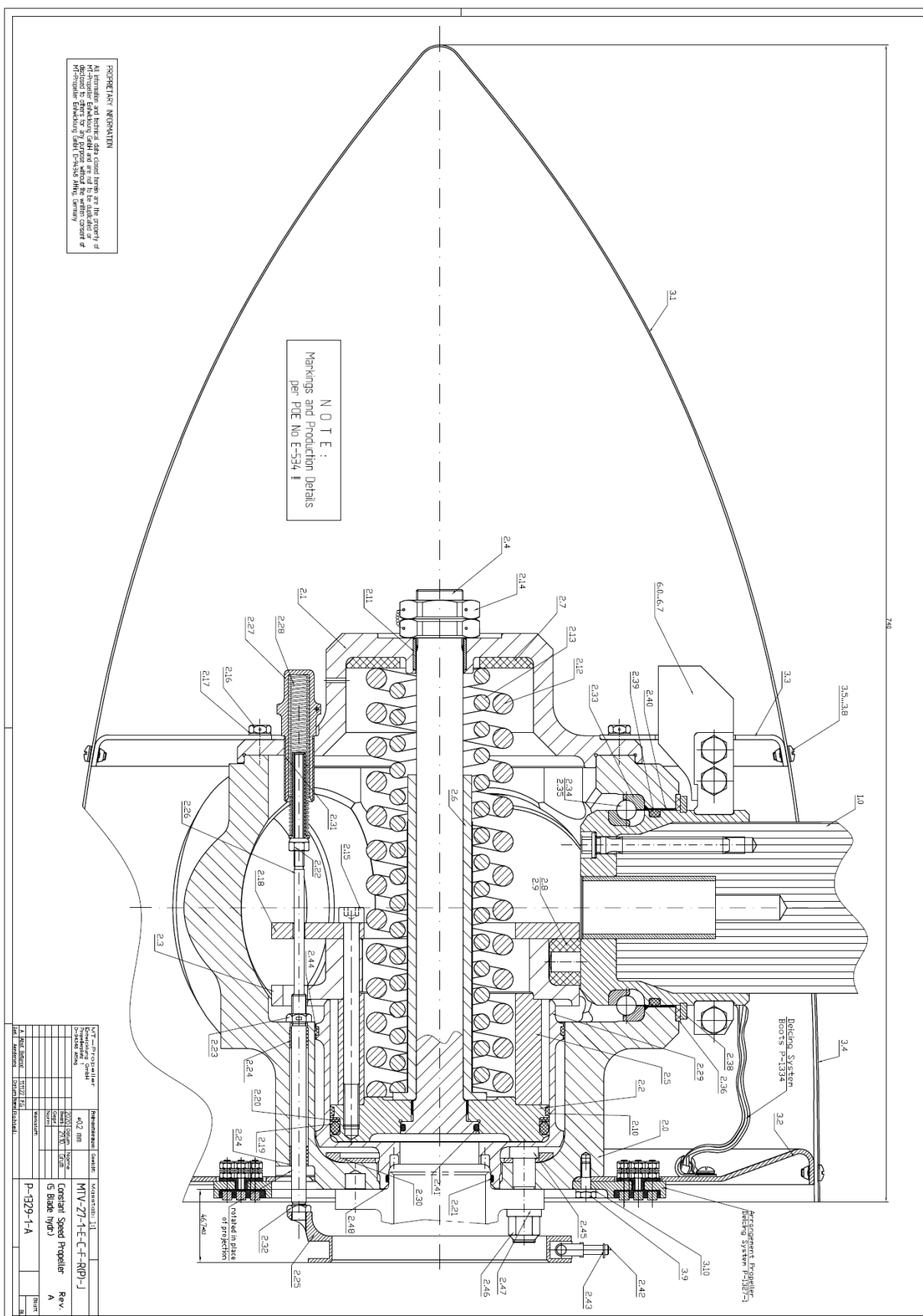
Propeller Drawing: P-1329: MTV-27-1-N-C-F-R(P)-J



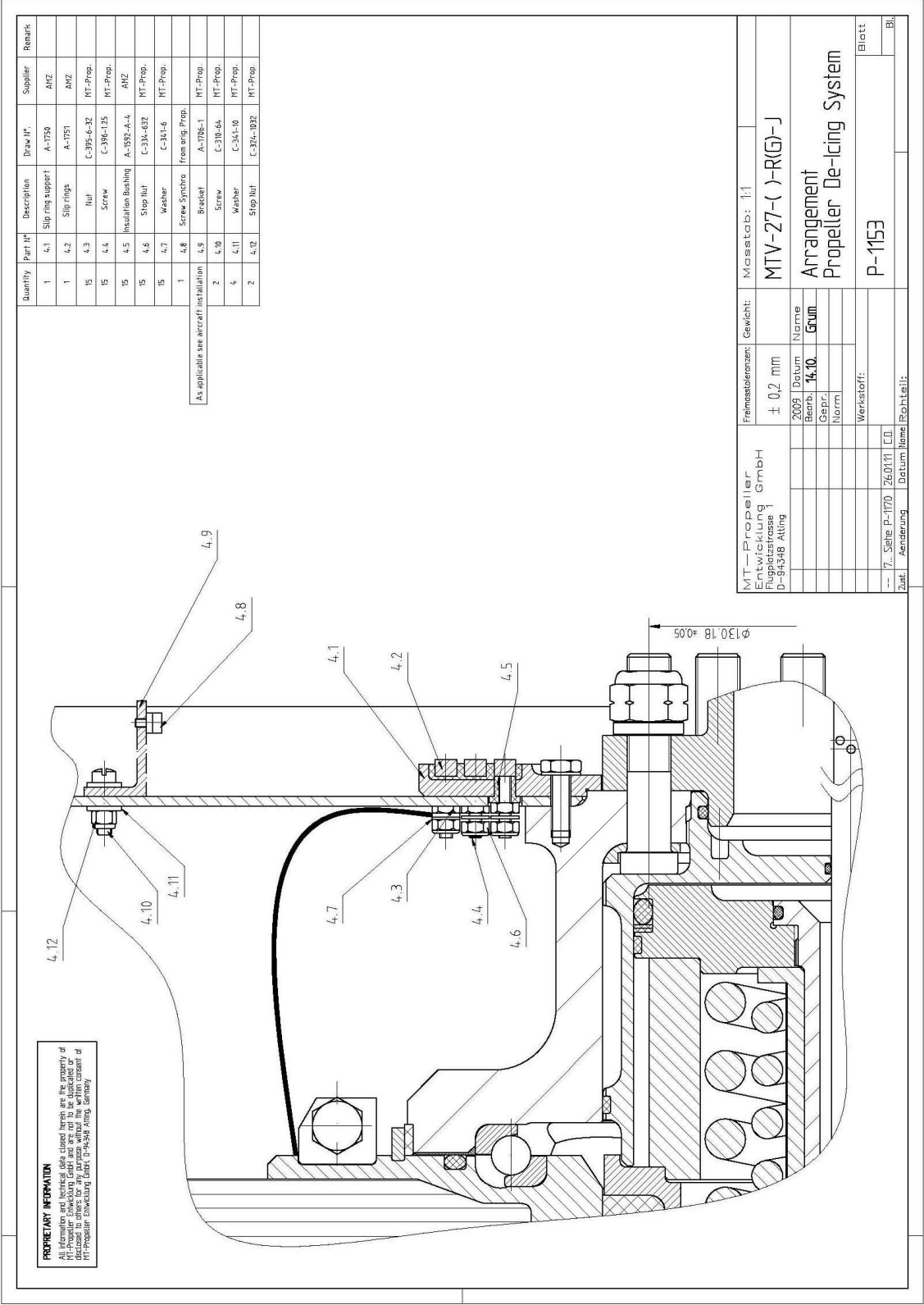


Propeller Drawing: P-1329-1:

MTV-27-1-E-C-F-R(P)-J

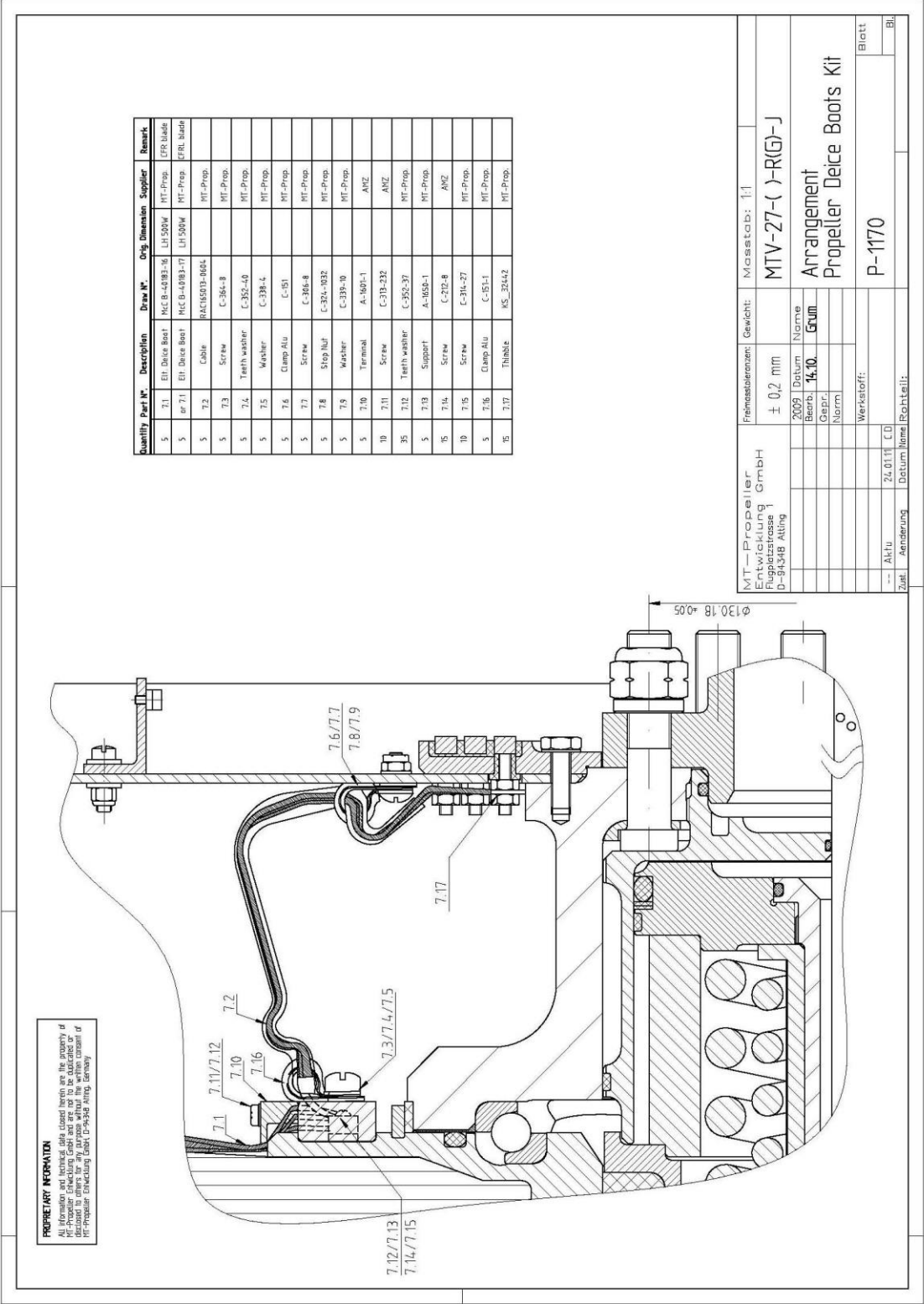


Propeller Drawing: P-1153: MTV-27-()-R(G)-J



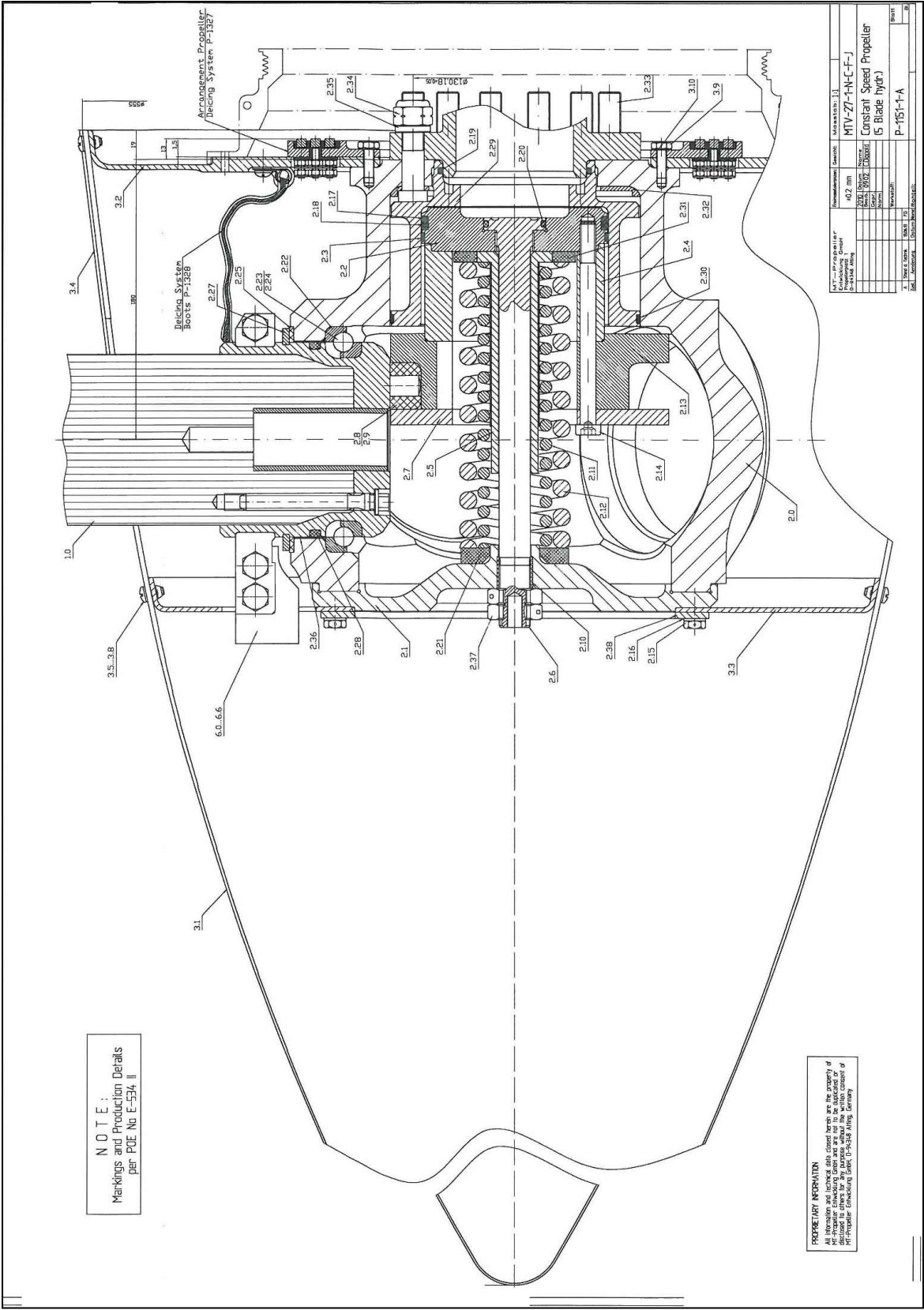


Propeller Drawing: P-1170: MTV-27-()-R(G)



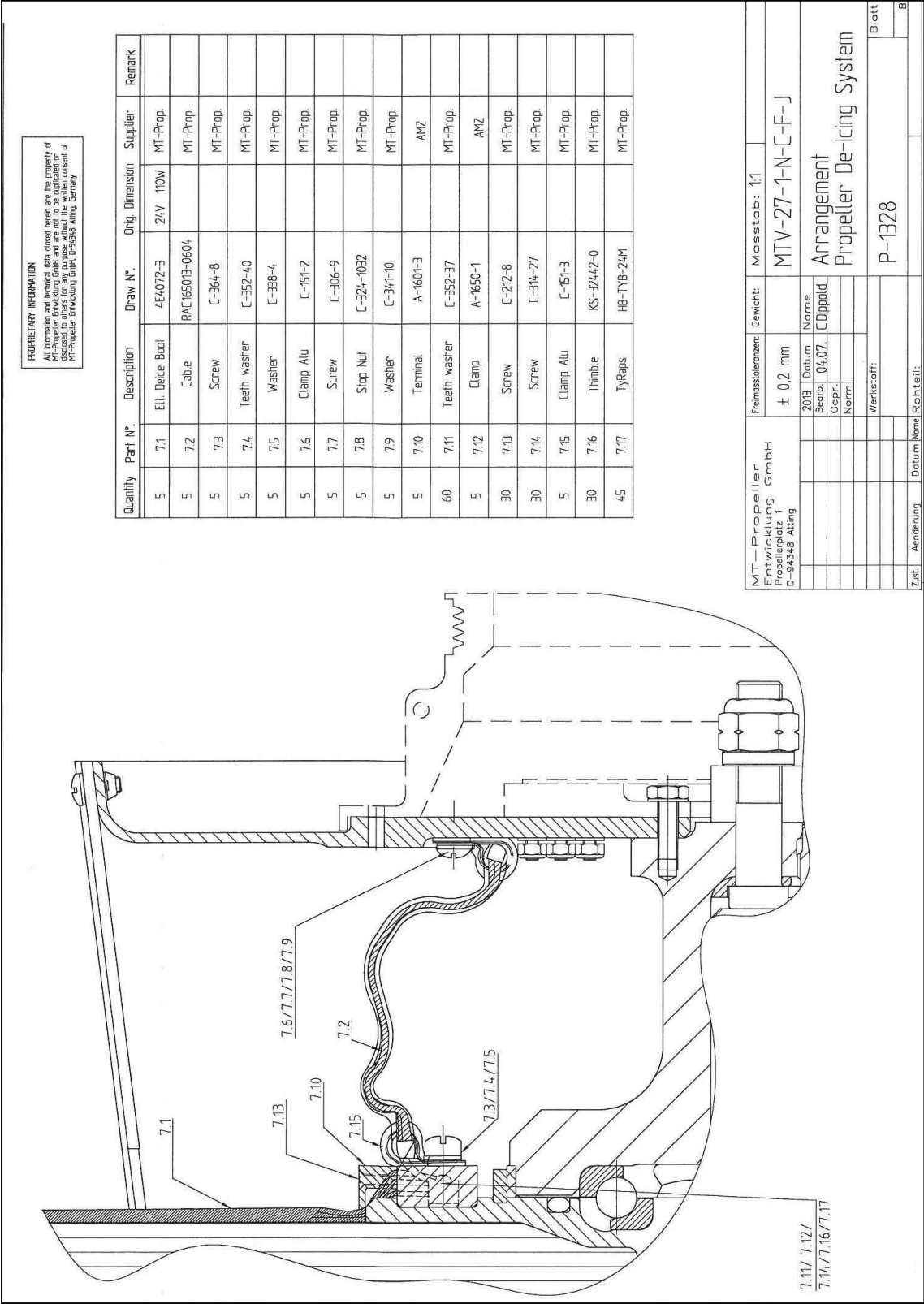


Drawing P-1151-1-A: MTV-27-1-N-C-F-J Constant Speed Propeller





Drawing P-1328: MTV-27-1-N-C-F-J Propeller De-Icing System





Drawing P-1327: MTV-27-1-N-C-F-J De-Ice Slip Ring

