



ATA 61-02-98

(E-1298)

**OPERATION- AND INSTALLATION AND MAINTENANCE
MANUAL**

**REVERSIBLE HYDRAULICALLY CONTROLLED
VARIABLE PITCH PROPELLER**

**MTV-5-()-R(H)
MTV-6-()-R(H)
MTV-9-()-R(H)
MTV-16-()-R(H)
MTV-22-()-R(H)
MTV-25-()-R(H)
MTV-27-()-R(H)
MTV-27-()-R(H)-J**

Revision 26: October 30, 2025

Der technische Inhalt dieses Dokuments ist aufgrund von DOA Nr. EASA.21J.020 zugelassen.
The technical content of this document is approved under authority of DOA No. EASA.21J.020.



DE.21G.0008
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 cannot 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



TABLE OF CONTENTS

Chapter	Title of Chapter			Page
	Table of Contents			3
	List of Effective Pages			4
	List of Inserted Revisions			5
	MT-Propeller Important Information			5-1
1.	General			6
2.	Model Designation			9
3.	Typical Blade design			10-1
4.	Design- and Operation Information			11
5.	Installation- and Operation Instruction			14
6.	Inspections			16
6.5	Special Corrosion Inspection and Treatment			24-1
7.	Maintenance			25
8.	Trouble Shooting			28
9.	Shipping and Storage			30
10.	Special Tools			30
11.	Airworthiness Limitations Section			30
12.	Propeller Drawings			
12.1	Propeller Drawing	MTV-5-1-W-C-R(H)	P-1179-()	31
12.2	Propeller Drawing	MTV-6-A-C-R(H)	P-1024-()	32
12.3	Propeller Drawing	MTV-9-(B,D,E,)-C-()-R(H)	P-1220-()	33
12.4	Propeller Drawing	MTV-16-1-E-C-R(H)	P-1275-()	34
12.5	Propeller Drawing	MTV-22-B-C-R(H)	P-1000-() P-1000-()	35
12.6	Propeller Drawing	MTV-25-1-B-C-R(H)	P-1052-()	36
12.7	Propeller Drawing	MTV-27-1-V-C-R(H) MTV-27-1-X-C-R(H)	P-1319-()	37
12.8	Propeller Drawing	MTV-27-1-YZ-C-R(H)-J MTV-27-1-N-C-R(H)-J:	P-1142-()	38



LIST OF EFFECTIVE PAGES

Page	Date	Page	Date	Page	Date
2	2016-10-24	22	2014-01-10	34	2016-03-08
3	2016-03-08	22-1	2022-07-25	35	2016-03-08
4	2025-10-30	22-2	deleted	36	2016-03-08
4-1	deleted	23	2016-03-08	37	2016-03-08
5	2014-03-05	24	2016-03-08	38	2017-07-04
5-1	2025-10-30	24-1	2025-10-30		
5-2	2016-03-08	25	2017-10-16		
6	2014-01-10	26	2022-07-25		
6-1	2016-03-08	27	2022-07-25		
7	2017-10-16	27-1	2017-03-21		
7-1	2016-03-08	27-2	2014-05-21		
8	2013-05-23	27-3	2014-05-21		
9	2014-01-10	27-4	2014-05-21		
10	2016-03-08	27-5	2014-05-21		
10-1	2016-03-08	27-6	2014-05-21		
11	2014-01-10	27-7	2014-05-21		
12	2014-01-10	27-8	2014-05-21		
12-1	2013-05-23	27-9	2016-10-24		
13	2012-08-22	27-10	2016-10-24		
13-1	2012-08-22	27-11	2016-10-24		
13-2	2013-05-23	27-12	2016-10-24		
14	2016-10-24	27-13	2016-10-24		
14-1	2016-10-24	27-14	2016-10-24		
14-2	2016-10-24	27-15	2017-07-04		
14-3	2025-10-30	27-16	2017-07-04		
14-4	2016-10-24	27-17	2017-07-04		
14-5	2016-10-24	27-18	2017-07-04		
14-6	2016-10-24	27-19	2017-07-04		
14-7	2016-10-24	27-20	2017-07-04		
15	2014-01-10	27-28	2017-07-04		
15-1	2016-10-24	27-29	2017-07-04		
15-2	2025-10-30	28	2014-01-10		
15-3	2017-07-04	29	2012-08-22		
16	2017-10-16	30	2016-03-08		
17	2017-07-04	30-1	2014-03-05		
18	2016-10-24	30-2	2015-02-25		
19	2019-02-26	31	2015-02-25		
20	2005-09-18	32	2015-02-25		
21	2014-01-10	33	2016-03-08		



LIST OF REVISIONS

Revision No.	Revision Date	Pages	Explanation
1	2005-09-18	1 -31	Original Revision
2	2006-07-11	3, 4, 5, 8, 11, 31, 32	Implementation of MTV-6-A-C-R(H)
3	2007-04-03	4, 5, 6, 7, 24	Overhaul
4	2007-05-21	3, 4, 5, 11, 12, 33	Implementation of MTV-25-1-B-C-R(H)
5	2007-09-24	3, 4, 5, 8, 9, 11, 12, 12-1, 13-1, 14, 14-1, 15, 15-1, 16, 23, 24, 26, 28, 29, 32, 33, 34, 35	Implementation of MTV-8-B-C-R(H)
6	2007-02-28	3, 4, 14	Torque / In-Field Removable Blades MTV-8-()
7	2008-03-10	4, 5, 10, 12-1, 15-1	N-Flange: Oil System to be used: Settings;
8	2008-04-15	4, 5, 12	Propeller Beta-Valve
9	2008-10-08	4, 5, 18	General Update
10	2010-02-09	4, 5, 14-1;	Assembly Instruction
11	2012-08-22	3, 4, 5, 11, 12, 12-1, 13, 13-1, 14-1, 15, 15-1, 28, 29, 31, 32, 33, 34, 35, 36;	General Update
12	2012-11-15	4, 5, 12;	Propeller Beta Valve
13	2013-05-23	3, 4, 5, 8, 9, 10, 11, 12, 13-2, 14, 14-1, 14,2, 15, 15-1, 26, 27, 30-1, 31, 32, 33, 33, 34, 35, 36, 37;	Drawings of MTV-5 and MTV-27 added
14	2014-01-10	3, 4, 5, 6, 7, 9, 11, 12, 14, 15, 16, 17, 21, 22, 23, 26, 28, 31, 32, 33, 34, 35, 36, 37;	General Update

**LIST OF REVISIONS: (CONTINUED)**

Revision No.	Revision Date	Pages	Explanation
15	2014-03-05	4, 5, 27-1, 27-2, 27-3, 27-4, 27,5, 27-6, 27-7, 30, 30-1;	Prevention of Erosion caused by Sea Water Installing a Polyurethane Tape; Shipping and Storage
16	2014-05-21	4, 5-1, 14, 14-01, 14-0-2, 27-1. 27-2, 27-3, 28-4, 27-5, 27-6, 27-7, 27-8;	
17	2015-02-25	3, 4, 5-1, 30-2, 31, 32, 33, 34, 35, 36, 37	Inclusion of Airworthiness Limitations Section
18	2015-10-08	3, 4, 5-1, 24-1	Inclusion of Special Corrosion Inspection and Treatment
19	2016-03-08	3, 4, 5-1, 5-2, 6-1, 7, 7-1, 10, 10-1, 22, 22-1, 22-2; 23, 24, 24-1 30, 33, 34, 35, 36, 37, 38;	MT-Propeller Important Information + MTV-9 with drawing P-1220-A drawing + Repair coated blade with Irathane
20	2016-10-24	2, 14, 14-1, 14-2, 14-3, 14-4, 14-5, 14-6, 14-7, 15-1, 15-2, 16, 17, 18, 26, 27, 27-9, 27-10, 27-11, 27-12, 27-13, 27-14;	Grease Leakes Installation of add Nickel Leading Edge Protection on Irathane Paint
21	2017-03-21	4, 5-1, 15-2, 16, 17, 27-1;	Inspections
22	2017-07-04	4, 4-1, 5-1, 15-2, 15-3, 27-15, 27-16, 27-17, 27-18, 27-19, 38;	Inspections, Chapter 7.9 Retorquing of additional Preload System on the MTV-27-1-()-J propellers added
23	2017-10-16	4, 5-1, 7, 16, 25;	TBO 2000 hours or 60 months. Time interval for grease fittings (300 hrs or 6 months) Maintenance;
24	2019-02-26	4-1, 5-1 19;	Remedy of Damages along Erosion Sheath;
25	2022-07-25	4, 4-1 deleted, 5-1, 22-1, 22-2, 26, 27;	Formatting, Shipping Information upgraded
26	2025-10-30	4, 5-1, 14-3, 15-2, 24-1;	Description of installation of anti-rotation pin improved, Chapter 6.22 reworked.

**MT-Propeller Important 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.



1. GENERAL

1.1 STATEMENT OF PURPOSE

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

In addition to the propeller assembly, the propeller governing (Beta Coordinator) system is addressed in this manual.

Installation, removal, operation and troubleshooting data is included in this publication. However, the Hovercraft 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-61-02-98 / E-2392

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

For MT-Propeller service literature contact:

MT-Propeller Entwicklung GmbH
Flugplatzstraße 1
D-94348 Atting
Germany

Tel.: xx49-9429-9409-0

Fax: xx49-9429-84 32

E-mail: sales@mt-propeller.com

Internet: www.mt-propeller.com



1.3 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.

1.4 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.



1.5 DEFINITION OF COMPONENT LIFE AND SERVICE

1.5.1 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 .

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.

A non-rotating propeller FOD does not require an overhaul, it only needs a blade repair or a blade exchange.

A blade damage with a non-rotating propeller cannot damage the propeller hub and therefore does not require an overhaul.

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 61-12-392 (E-2392).

The overhaul interval for the propellers (TBO) is shown in *Service Bulletin No. 1-1* (latest issue).



1.5.2 Repair

Repair is correction of minor damage caused during normal operation.
It is done on an irregular basis, as required.
See Service Letter No. 32 () latest issue.

1.5.2.1 A repair does not include an overhaul.

1.5.2.2 Amount, degree and extent of damage determines whether or not a propeller can be repaired without overhaul. A blade damage due to a ground strike always requires an overhaul.

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.

A non-rotating propeller FOD does not require an overhaul, it only needs a blade repair or a blade exchange.

A blade damage with a non-rotating propeller cannot damage the propeller hub and therefore does not require an overhaul.

1.5.3 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: 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 61-12-392 (E-2392)

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



1.6 REVERSIBLE PROPELLERS

1.6.1 Reversible propellers with blade angle feedback are used primarily for Hovercraft- and Airship Installations, but not limited to those installations. Mechanical stops are full forward and full reverse.

1.6.2 The beta feedback connection of the propeller is with the P-869, P-1143-(), Beta-Valve and Beta Tube.

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

MT	V	-	22	-	1	-	B	-	C	-	()	-	()	-	()	()
1	2		3		4		5		6		7		8		9	10

10: Capital letter = Modifications which restrict or exclude interchangeability
 Small letter = Modifications which not affecting interchangeability.

9: (A) = Reverse System Allison 250 B17-()
 (G) = Reverse System Garret TPE-331-()
 (H) = Reverse System Hovercraft
 (M) = Reverse System Mühlbauer
 (P) = Reverse System Pratt & Whitney PT6A-()
 (W) = Reverse System Walter M601-()

8: R = Reversing System installed

7: F = Feathering System installed

6: Letter Designation Counterweights
 C = Counterweights mounted for pitch change moments
 towards high pitch / feathering

5: Code for Propeller Flange

B = SAE Nr. 2 mod.

D = ARP 502

E = ARP 880

N = Turbo Propeller Flange for PT6A-67A Engine

W = BCD 120,65 mm, 6 bolts M12 and center diameter 57,18 mm

V = BCD 180,00 mm, 12 bolts M16 and center diameter 85 mm

X = BCD 150,00 mm, 14 bolts M12 and 2 Index Pins, center diameter 85 mm

Y = BCD 240,00 mm, 16 bolts M16 and 2 Index Pins, center diameter 160 mm

Z = BCD 140,00 mm, 12 bolts M10 and center diameter 80 mm

4: Consecutive Number of Series

1 = applicable for:

MTV-5 / MTV-6 / MTV-16 / MTV-22 / MTV-25 / MTV-27 / MTV-27-1-()-J;

3: Consecutive Number of Basic Type

2: Variable Pitch Propeller

1: MT – Propeller Manufacturer



2.2 BLADE DESIGNATION

() 1	() 2	200 3	-	15 4	() 5
----------	----------	----------	---	---------	----------

5: Small Letter = Modifications which do not affect interchangeability of blade sets.
Capital Letter = Modifications which restrict or exclude interchangeability of blade sets.

4: Consecutive Number of Basic Type (including Aerodynamic Design)

3: Diameter in cm

2: Sense of Rotation

Blank = Right Hand Tractor
RD = Right Hand Pusher
L = Left Hand Tractor
LD = Left Hand Pusher

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

The complete propeller designation is a combination of both designations, for instance MTV-22-B-C-R(H)/CRLD152-23.

The hub-serial number starts with the year of manufacture.
All records of the propeller are registered in respect to this number.

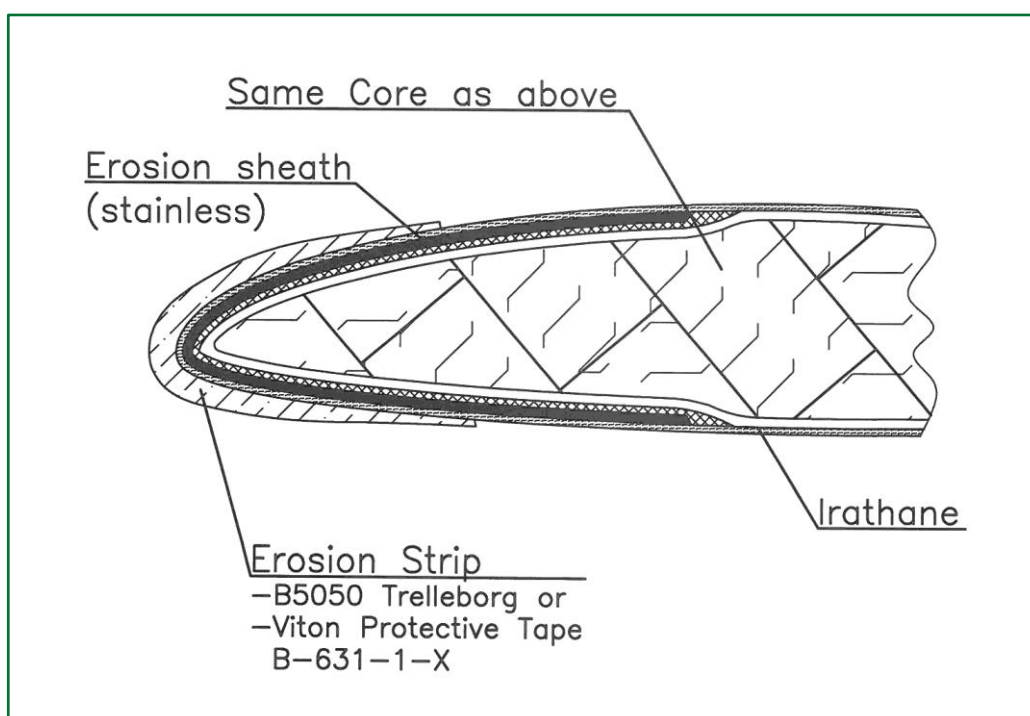
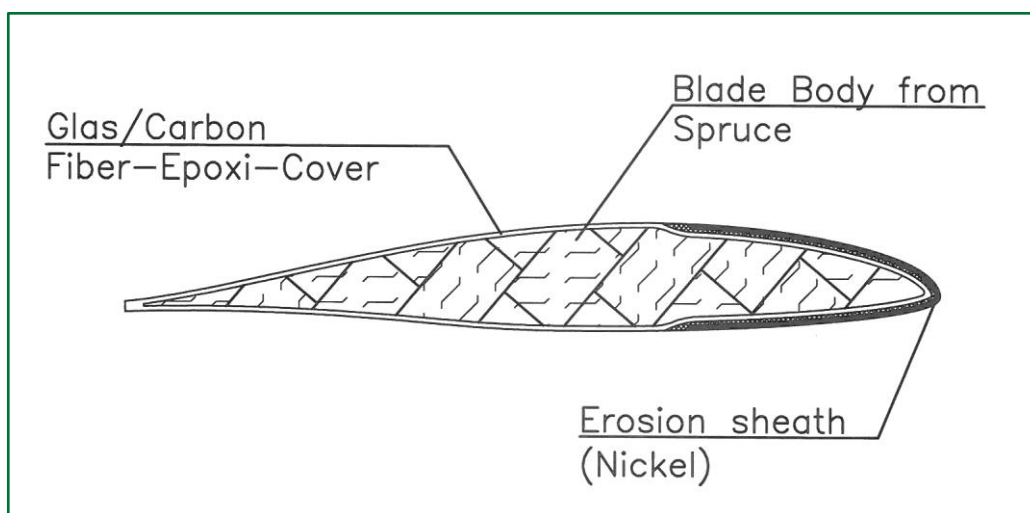
The propeller for a certain Hovercraft - engine - combination is always defined according the hub-, blade- and spinner combination.
For the actual blade settings, depending on the Hovercraft model, the propeller- logbook must be considered.



3. TYPICAL BLADE DESIGN

As an optional erosion protection for the blade, same can be coated with Irathane Paint about 1.2 mm thick.

An additional leading edge protection may be performed by gluing special rubber and metal strips to the Irathane coating.





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
- Beta Valve

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 / blade ferrules 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.

The MTV-27-1-()-J -Propeller can be equipped with in-field-removable blades. This option is mainly used on bigger diameter propellers for better repair, in-field blade replacement and shipping. Furthermore the MTV-27-1-()-J Propeller has an additional preload bearing which can be preloaded only in the factory.

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 high pitch in case of oil pressure loss.

The hydraulic pitch change mechanism contains a piston. In the normal operating range the pitch change piston moves between full forward and the reverse stop.

4.3 FOR HOVERCRAFT AND AIRSHIP APPLICATION

Outside the hub are two check nuts or 1 stop nut.

High pitch stop (for counterweighted propellers) and reverse stop (for none-counterweighted propellers) can be adjusted by turning the check nuts / stop nut.

The beta tube is installed in the guide rod. Due to turning the beta tube inside or outside, the blade angle can be adjusted.

For MTV-6, MTV-22 and MTV-25 the beta tube is secured by the screw C-300-13.

For MTV-5, MTV-16 and MTV-27 and MTV-27-1-()-J secure with screw C-300-14 and for all type of propellers the stop nut C-323-832 has to be used.

Both sides washers C-341-10 have to be put on for all type of propellers.



4.4 BLADE

The presently used blades are of natural composite design, using high compressed wood in the root and lightweight wood in the remaining body.

Epoxy fiberglass covers the entire blade surface and is painted with acrylic lacquer.

The outer portion is protected against erosion by a bonded on stainless steel or nickel erosion sheath.

The stainless steel- or nickel erosion sheath is approximately 50 to 70 cm long.

The inner portion of the blade is protected by a self-adhesive PU-strip.

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

4.5 COUNTERWEIGHTS

Propellers with reverse can be 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 C200-15. With counterweights installed in case of oil pressure loss the blades turn to forward pitch.

4.6 SPINNER

The spinner dome is a one-piece part made from fiber reinforced composite.

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

4.7 PROPELLER BETA-VALVE

The Beta Valve P-869 offers the possibility of a direct blade angle feedback from full forward to full reverse pitch.

The Beta-Valve P-869 for MTV-6 /-22/-25 is connected to a pressure line (270–350 PSI; pump capacity approx. 10 qts/min) and a drain line.

This pressure results in an adjustment force of the control lever of 10–20 N (2,2-4,4 lbs) and an internal leakage of 0,85 qts/min up to 1,8 qts/min depending on oil viscosity.

For the MTV-5, MTV-16, MTV-27 and MTV-27-1-()-J the beta valve P-1143-() is connected to a pressure line (270-350 PSI); pump capacity approx. 12 qts/min) and a drain line.

This pressure results in an adjustment force of the control lever of 15-30 N (3,3 to 6,6 lbs), a brake away force in the end positions of approximately 90 N (19,8 lbs) and a leakage of 2,27 qts/min. up to 3,6 qts/min depending on oil viscosity.

Attention:

If more pressure is used the friction of the Beta Coordinator will increase resulting into a higher force to push / pull the adjusting lever.

WARNING:

IN THE DRAIN LINE NO BACK PRESSURE IS ALLOWED!

IN CASE OF QUESTION MEASURE THE BACK PRESSURE IN THE RETURN LINE!



The pressure line is on top of the Beta Valve on P-869 and on P-1143-() on both sides and the drain line below. A mechanical push pull rod is connected to the adjusting lever, which gives them a direct blade angle feed back in operation.

The maximum travel of the short Beta Lever (standard on MTV-6, -22, -25) is 2 inch (51 mm) from full forward to full reverse.

For the P-1143-(), the maximum travel is 2,36 inch (60 mm) from full forward to full reverse; see drawing on page 13-1.

On the beta valve P-1143-() optionally a composite bushing is installed on the push pull rod to serve as a mechanic hydraulic reverse stop.

As the coordinator P-1143-() has a total travel of 2,36 inch (60 mm) and the propellers need maximum approximately 2,12 inch (54 mm), the travel should be adjusted to not reach the mechanical stops in the beta valve and by this the control force of the push-pull-rod is reduced.

4.8 BETA TUBE FOR BETA VALVE P-869 AND P-1143-()

The Beta Tube is a one-piece-part made out of 3 single elements.
The Beta Tube must have a full concentric run that no wobble is obvious.

The angular tolerance between the two interfaces (rotor side, hydraulic actuator side) must be 0,05°.

The alignments tolerances must be 0,2 mm (0,0078 inch).

If the distance between the engine / propeller drive shaft to the Beta Coordinator is bigger than 12 inch (300 mm) the Beta Tube must be additionally guided in the drive shaft by a composite guide.

Attention:

If the Beta Tube is not guided or has excessive wobble, it may fail during operation which results in an uncontrolled propeller.

4.9 OIL SYSTEM TO BE USED

For a good dynamic response of the propeller, it is recommended to supply the Beta Valve and the Beta Tube with the following mineral oil based hydraulic oil:

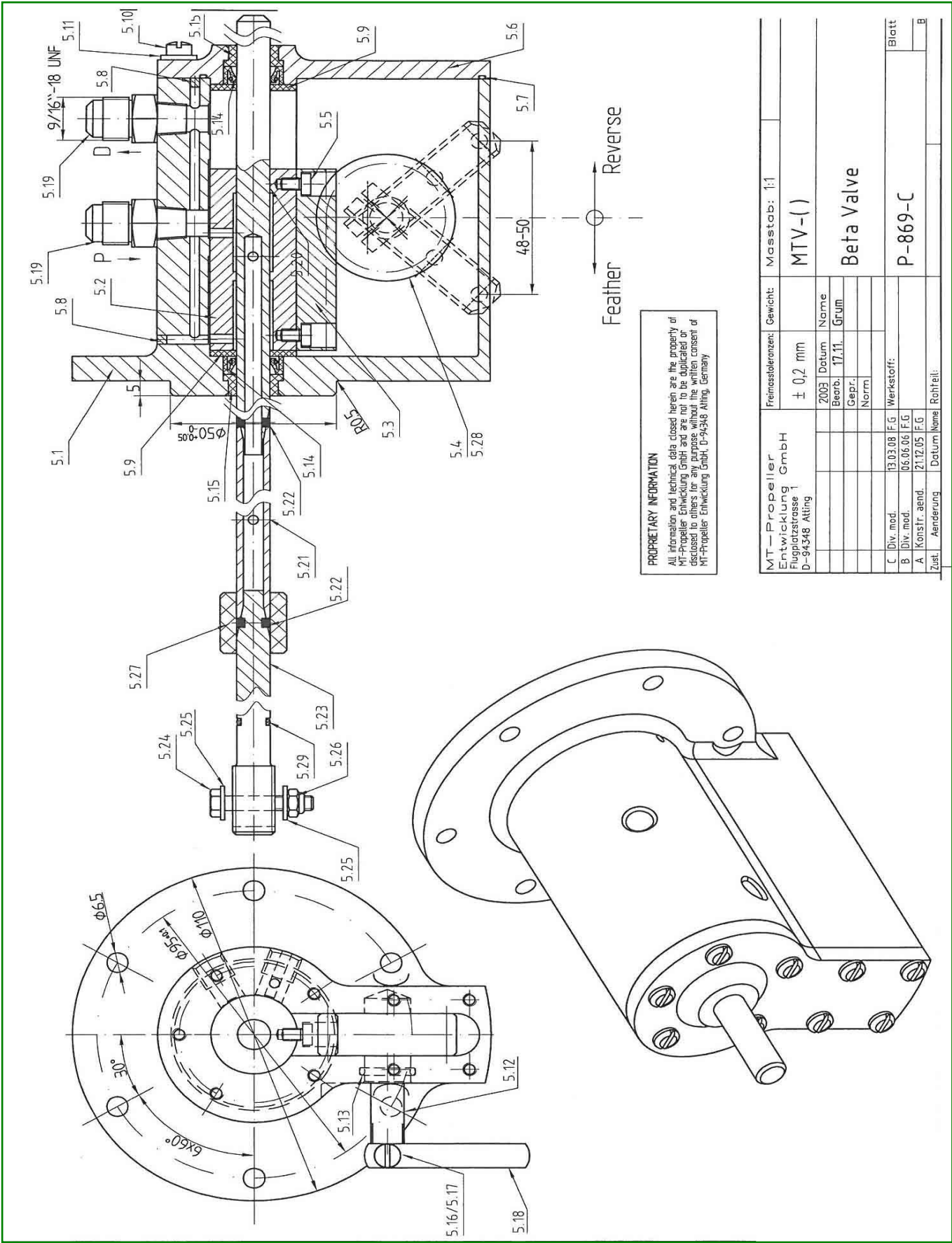
HLP-10 according to DIN 51 519 and DIN 51 524 Part 2
EXXON Univis HVI 13
or similar

Drawing P-869 and P-1143-() see next pages!



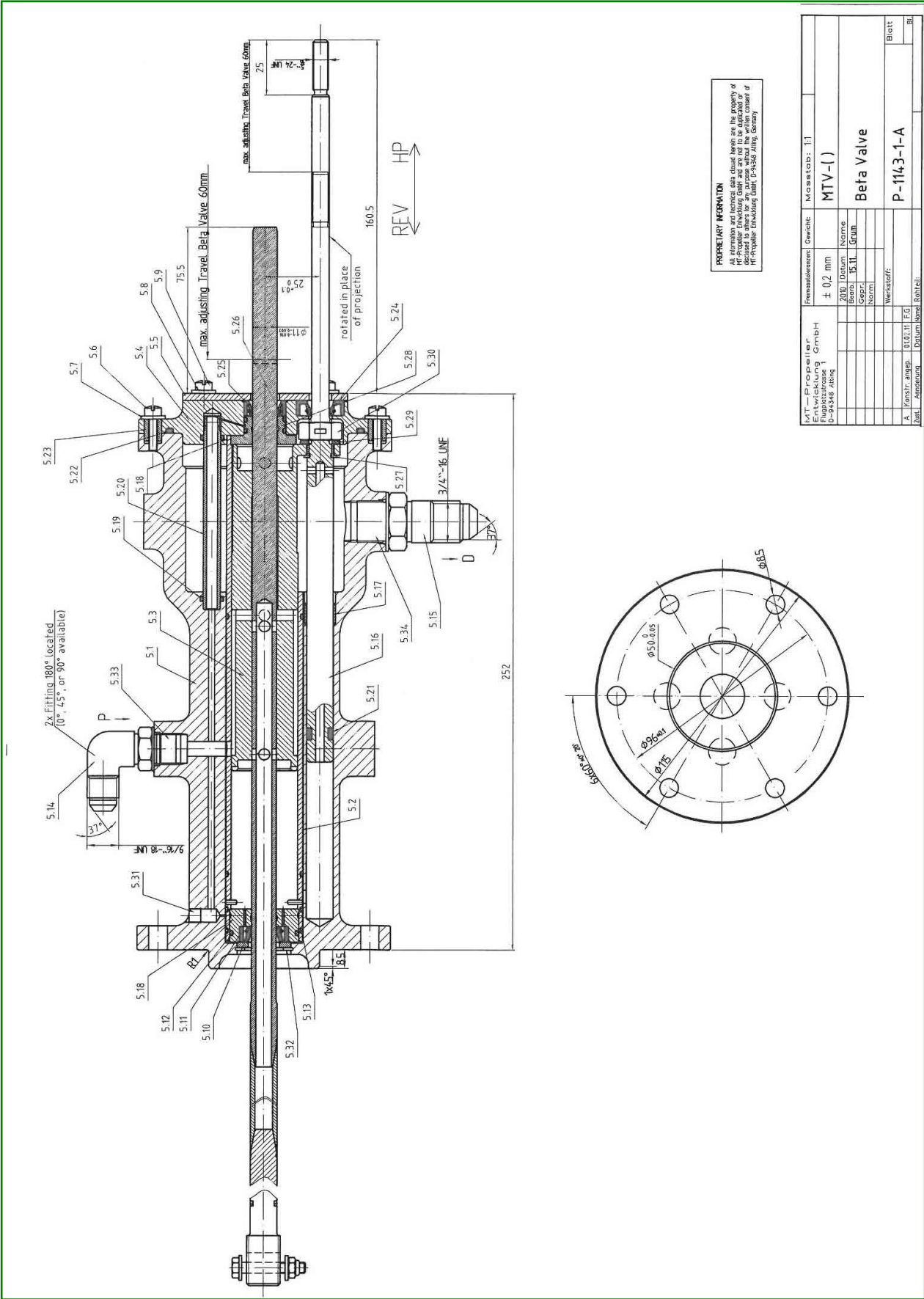
4.10 DRAWINGS BETA VALVE

4.10.1 Drawing P-869: Beta Valve



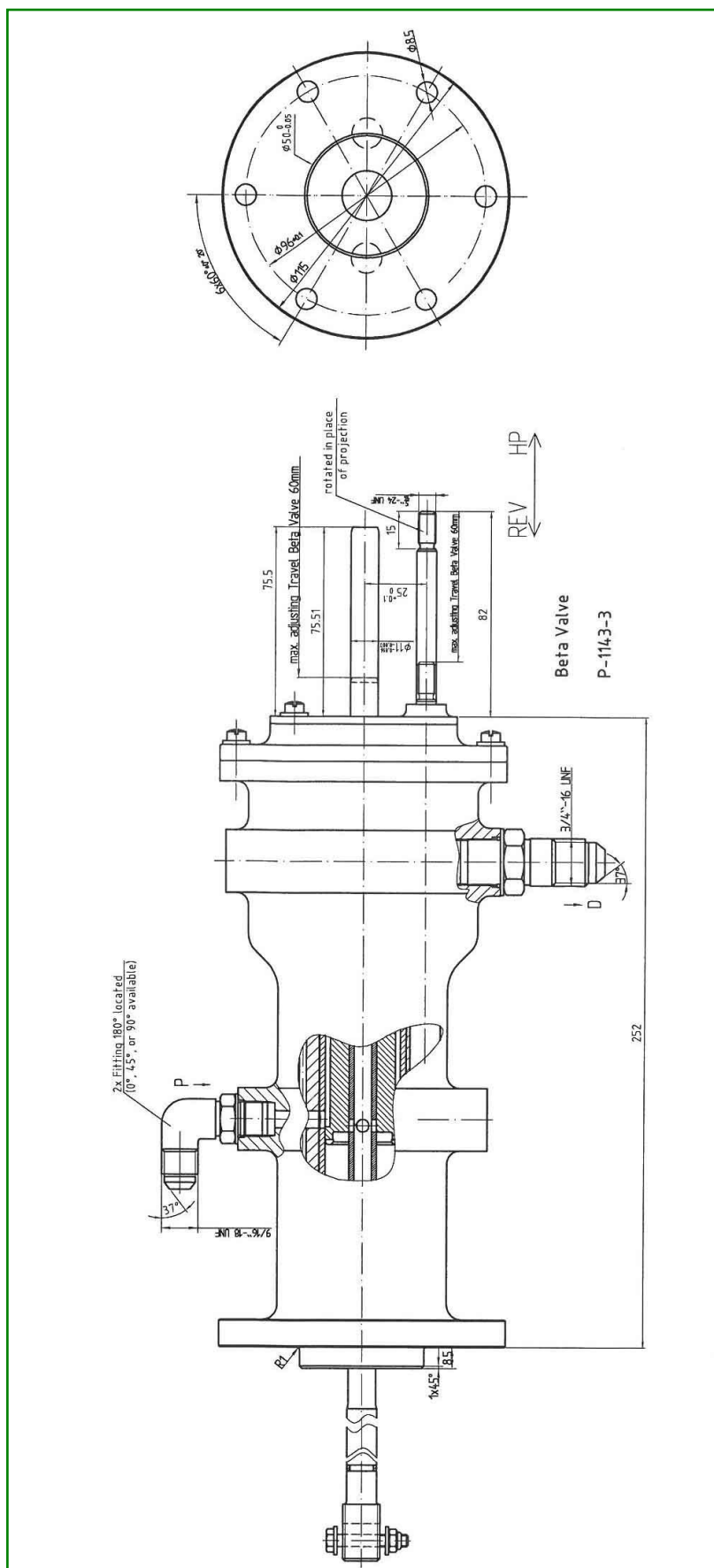


4.10.2 Drawing P-1143-1 Beta Valve





4.10.3 Drawing P-1143-3 Beta Valve





5. INSTALLATION AND OPERATION INSTRUCTION

- 5.1.1 All propellers of these designs are only suitable for installation on flange type engines. The code for the flange type and size can be seen from the model designation (see chapter 2).
- 5.1.2 The described propellers are usually installed on the engine with the blades in high pitch position / CW propellers or Reverse - None CW propellers.
- 5.2 Electrical propeller de-icing may be used optionally.
Complete Goodrich kits have to be installed according to Manual 30-60-02.
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.
- 5.4 Check position of O-ring in propeller flange, if applicable.

WARNING:
DO NOT INSTALL AN ADDITIONAL O-RING ON ENGINE FLANGE.

Grease Leak on Blade Surface!

NOTE:

THE FIRST RUN-UP OF A NEW OR OVERHAULED PROPELLER MAY LEAVE GREASE ON THE BLADES AND INNER SURFACE OF THE SPINNER DOME.

THIS IS NORMAL AND DO NOT MEAN THAT IT WILL BE A CONTINUING GREASE LEAKAGE.

REMOVE ANY GREASE ON THE BLADES OR INNER SURFACE OF THE SPINNER DOME BY USING A MILD SOLVENT. MINOR GREASE LEAK WHICH CAN BE SEEN ON ONE OR ALL BLADE ROOT(S) AND SPINNER SHOULD BE MONITORED IF IT GETS WORSE.

IF THE GREASE LEAK DOES NOT SPRAY MORE THAN 7 INCHES (18 CM) ON THE BLADE SURFACE FROM THE BLADE ROOT OUTSIDE THE BLADE FERRULE IN 5 HOURS OF OPERATION, IT IS DEFINED AS MINOR AND SHOULD BE ONLY MONITORED!

CONTINUED GREASE LEAKAGE AFTER 20 HOURS OF OPERATION FROM FIRST LEAKAGE REQUIRES REPAIR AT AN AUTHORIZED SERVICE REPAIR FACILITY WITHIN 5 OPERATING HOURS.

IN CASE OF DOUBT CONTACT MANUFACTURER!



5.4.1 Installation of In-Field Removable Blades on MTV-27-1-()-J Propellers

WARNING:

NEVER POLISH THE FERRULE OUTER DIAMETER ON THE BLADE OR INNER DIAMETER ON THE FERRULE INSTALLED IN THE HUB, BECAUSE THE SURFACES ARE SPECIAL TREATED FOR HARDINESS.

IF POLISHED, THE SURFACE IS LOSING THE HARDINESS AND MAY CREATE FRETTING.

ONLY CLEAN FERRULE WITH A TOWEL.

Loosen the nut of the clamp bolt / counterweight bolt.

Install the O-ring No. C-055-94 in groove on the blade shank (Fig. 1 - surface marked)

Check, that the inner and outer ferrule is cleaned and grease free!

Check that there are no damages on the thread of the ferrules

Lubricate the blade ferrule thread with MT 2 Propeller Grease or oil.



Figure 1: Lubricated O-Ring and thread on the blade ferrule



Figure 2: Cleaned degreased surface.



Figure 3: Cleaned surface but not polished.

**Attention:**

Do not grease the cylinder blade ferrule outer/inner diameter, otherwise the friction will not be high enough to stop the blade from rotation during operation.

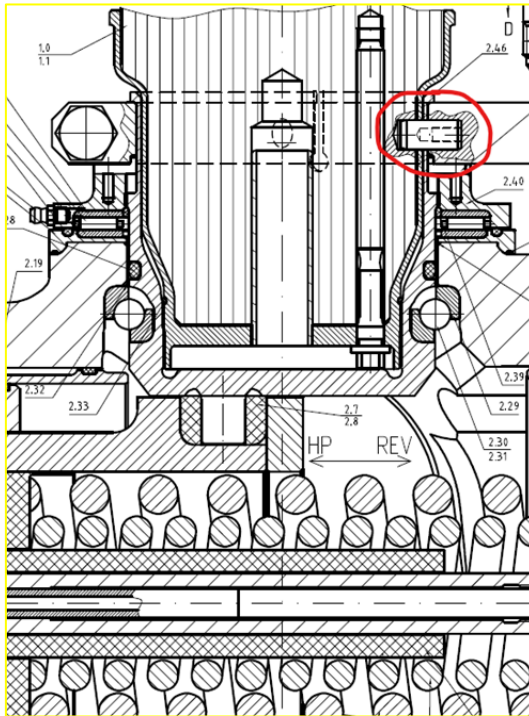
Screw the blade totally in the outer blade ferrule and turn it back to the right position marked with paint and align the bore of the anti rotation pin

The marking line on the blade shank must coincide with line on the blade ferrule.

Fill the bore outer surface with silicone RTV 109 or similar before installing the pin.

By this, moisture is avoided to enter the pin bore during operation.

Punch the pin in with a soft hammer until it stops.

**Attention:**

Do not use too much force to drive in the pin in order not to damage the ferrule.

Check that the pin is punched in deep enough and has a tight seat – it should no longer be able to be moved by hand – to act as the anti-rotation pin between blade, outer ferrule and counterweight.

Wipe off the excessive silicon after the pin installation. On the counterweights there are 6 possible pin positions marked with A B C D E F.

One position is used to punch in the index anti rotation pin.

In case the blades are replaced by a new blade, a different pin position can be used to set the correct blade angle.

WARNING:

IF A NEW PIN BORE IS DRILLED, AFTER DRILLING, TURN BLADE SLIGHTLY TO THE LEFT AND TO THE RIGHT TO GET ACCESS TO DEBURR THE INNER BORE IN THE BLADE FERRULE BEFORE TURNING THE BLADE OUT.

THE MAXIMUM DEEPNESS OF THE BORE SHOULD BE NOT MORE THAN 10 MM IN THE WOODEN PART.

IF THE BLADE IS TURNED OUT WITHOUT DEBURRING THE BORE, FRETTING MAY CAUSE DAMAGING THE OUTER BLADE FERRULE.

Record which position you use for which blade and which hub serial number.

Tighten the nut of the clamp bolt / counterweight bolt with torque 150-170 Nm (111-126 ftlbs).

If de-icing is applied, connect the lead wire to the de-icer.



After the anti-rotation pin is punched in, seal the not used bores in the counterweight with silicone according to Figure 1.



Figure 1

Seal also the counterweight contact line to the inner ferrule and outer ferrule around the entire surface diameter approximately 10 mm wide to avoid moisture entering between the ferrules and the slot in the outer ferrule to the inner ferrule (see Figure 2).



Figure 2



Finally seal from the preload nut to the counterweight on both sides from the bolt which fixes the counterweight to the counterweight itself with Silicon RTV 109 or similar.



Figure 3

Caution: O-Ring prevents moisture to get into the blade bushing thread.
Use only original O-rings approved by manufacturer.
Silicone before the pin installation must be applied to avoid moisture to enter into the blade root.

Silicone also prevents moisture to get between the inner and outer blade ferrule!

See picture of Figure 1 "O-Ring Installation in Groove of the Blade Shank" on next page!



O-Ring (C-055-94) Installation in Groove of the Blade Shank

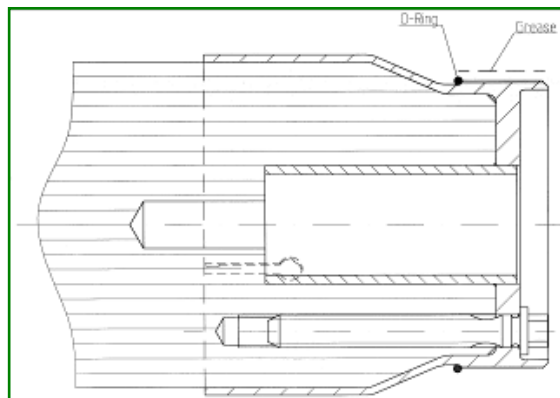


Figure 1

5.5

Measure the distance „X” (see Figure 2) 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” for the beta tube in the propeller hub (only on some models) and on the beta rod „A” must be replaced with every propeller installation (see Figure 2-1).

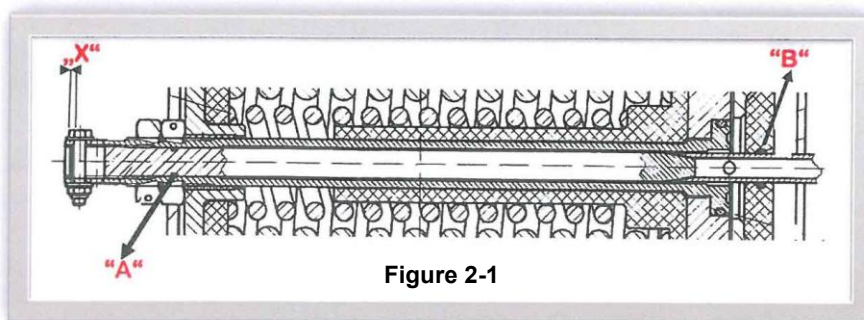


Figure 2-1

The propeller MTV-5 and MTV-27 have both O-Rings on the beta tube installed (see Figure 2-2)

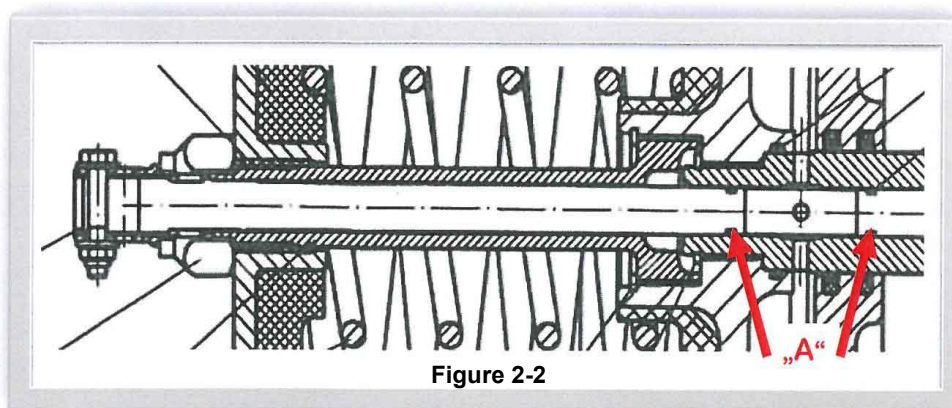


Figure 2-2



- 5.6** Install the propeller carefully to the engine flange. Observe the position of the index pins. Please note that the propeller should not be pulled onto the engine flange with the nuts in order to avoid damage of the hub and to avoid shearing off chips causing oil leaks on the O-ring.

Attention:

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

- 5.7** Stop nuts with washers should be tightened crosswise with equal force.

Torque:

1/2"-20 UNF bolts	(< 300 HP)	85 - 90 Nm	63 - 66 ftlb
1/2"-20 UNF bolts	(> 301 HP)	120 - 135 Nm	89 - 99 ftlb
1/2"-20 UNF stopnuts	(< 300 HP)	85 - 90 Nm	63 - 66 ftlb
1/2"-20 UNF stopnuts	(> 301 HP)	110 - 115 Nm	81 - 85 ftlb
9/16"-18 UNF stopnuts		135 - 150 Nm	100 - 111 ftlb
M12 stop nuts		85 - 90 Nm	63 - 66 ftlb
M16 stop nuts		150 - 155 Nm	111 - 114 ftlb

NOTE:

TORQUE VALUES ARE VALID FOR DRY, FREE-MOVING THREADS ONLY.

- 5.8** Install spinner, if applicable, on support plates, observe mating marks.
Torque screws with plastic washers 34 - 44 inlb.
Check run-out of the dome. Max. 0,08 inch permissible.

- 5.9** Installation of the Beta Tube

WARNING:

**DO NOT SHEAR-OFF MATERIAL OF THE O-RING NO. A+B (SEE FIG. 2 ON PAGE 14-1) DURING INSTALLATION OF THE BETA TUBE.
THIS WILL CAUSE OIL LEAKAGE.**



5.10 ADJUSTING

Mechanical high pitch stops and reverse stops are adjusted during manufacture, according to the requirement of the engine / application.

Hydraulic low pitch can only be adjusted via the beta tube setup. High pitch (on counterweighted propellers) and reverse (on non-counterweighted propeller) can be adjusted by turning the check nuts.

5.10.1 Setting the Low Pitch

Set the low pitch blade angle with the Beta Valve and due to turning the Beta Tube in or out. Refer to Figure 2, page 14-1.

Turning in: Lower pitch

Turning out: Higher pitch

Or vice versa on non-counterweighted propellers.

For MTV-6, MTV-22 and MTV-25 the Beta Tube is secured by the screw C-300-13.

For MTV-5, MTV-16 MTV-27 and MTV-27-1-()-J secure with screw C-300-14 and for all type of propellers the stop nut C-323-832 has to be used.

Both sides washers C-341-10 have to be put also on for all type of propellers.

5.10.2 Setting the Neutral Pitch on Propellers which is approximately -2 Degree Blade Angle:

The following steps must be followed:

- Set the control arm at the Beta Coordinator in the middle of the maximal travel,
- Turn in the Beta Tube from the propeller side and guide it into the Beta Coordinator,
- Turn in the Beta Tube that the O-ring which seals the Beta Tube on the front side is engaged,
- Pressurize the Beta Coordinator with oil pressure,
- Turn the Beta Tube in or out that the blades are flat and in an approx. -2 blade angle position and that the 75% radius station has an approx. -2° pitch,
- For MTV-6 / MTV-22 / MTV-25 secure with screw C-300-13.
- For MTV-5 / MTV-16 / MTV-27 and MTV-27-1-()-J secure with screw C-300-14.

5.10.3 Setting to ensure that the complete travel of the blade angle is given:

- Set the control arm at the beta coordinator P-869 to maximum open position on beta coordinator P-1143-() to approximately 0,16 inch (4 mm) before mechanic stop of maximum open position. This results for counterweighted propellers in maximum high pitch position and for none counterweighted propeller in maximum reverse pitch position.
- Turn Beta Tube to the maximum out position on the propeller side.
- Switch on hydraulic supply pressure and check that no movement of the propeller is found.

**Attention:**

If the propeller moves in this position maybe the distance between the propeller mounting flange and mounting flange of the beta coordinator is too close; re-check dimension X of the assembly drawing.

- After hydraulic pressure is supplied turn in the Beta Tube until movement of the propeller blades is observed. At the position where the propeller blades start to move turn Beta Tube half turn out and secure with screw C-300-13 or C-300-14.

5.11 After the ground runs, check for oil leaks, blade shake and condition of the de-ice system. On all in-field-removable blades check for any movement of the blade in the outer ferrule by the markings (NO MOVEMENT AT ALL IS ALLOWED!)

5.12 Perform test run in accordance with the description in the manual.

5.13 OPERATION

Propeller and Beta Valve system are selected as a result of tests.

The Beta Valve allows a direct blade angle feedback but no constant speed operation. Overspeed protection must be provided by the engine control

In case of failure of oil pressure, the propeller automatically goes into feathering on counterweighted-propellers and reverse on non-counterweighted-propellers.



6. INSPECTIONS

Attention:

It is strongly recommended to wash the propeller with fresh water every day after operation to prevent corrosion.

6.1 DAILY INSPECTION

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 blade shake at all is allowed on MTV-27-1-()-J propellers with additional blade preload system.

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

NOTE:**POSSIBLE GREASE LEAK ON BLADE SURFACE:**

THE FIRST RUN-UP OF A NEW OR OVERHAULED PROPELLER MAY LEAVE GREASE ON THE BLADES AND INNER SURFACE OF THE SPINNER DOME.

THIS IS NORMAL AND DO NOT MEAN THAT IT WILL BE A CONTINUING GREASE LEAKAGE.

REMOVE ANY GREASE ON THE BLADES OR INNER SURFACE OF THE SPINNER DOME BY USING A MILD SOLVENT.

MINOR GREASE LEAK WHICH CAN BE SEEN ON ONE OR ALL BLADE ROOT(S) AND SPINNER SHOULD BE MONITORED IF IT GETS WORSE.

IF THE GREASE LEAK DOES NOT SPRAY MORE THAN 7 INCHES (18 CM) ON THE BLADE SURFACE FROM THE BLADE ROOT OUTSIDE THE BLADE FERRULE IN 5 HOURS OF OPERATION, IT IS DEFINED AS MINOR AND SHOULD BE ONLY MONITORED!

CONTINUED GREASE LEAKAGE AFTER 20 HOURS OF OPERATION FROM FIRST LEAKAGE REQUIRES REPAIR AT AN AUTHORIZED SERVICE REPAIR FACILITY WITHIN 5 OPERATING HOURS

IN CASE OF DOUBT, CONTACT MANUFACTURER.



6.2 100 HOURS INSPECTION

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

No blade shake at all is allowed on MTV-27-1-()-J propellers with additional blade preload system.

NOTE:

MEASURE THE BLADE SHAKE IN FLIGHT DIRECTION AND OPPOSITE FLIGHT DIRECTION!

CHECK DURING THE BLADE SHAKE MEASUREMENT THE RELATIVE MOVEMENT FROM THE BLADE PRELOAD NUT TO THE HUB ON PROPELLERS WITH ADDITIONAL BLADE PRELOAD SYSTEM.

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, AND 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!

ON MTV27-1-()-J PROPELLERS WITH IN-FIELD-REMOVABLE BLADES CHECK FOR ANY ROTATION OF THE BLADE IN THE OUTER FERRULE AS WELL AS FOR THE CORRECT POSITION OF THE ANTI-ROTATION PIN.

NO ROTATION AT ALL IS ALLOWED!

IN CASE BLADE HAS MOVED, LOOSEN STOP NUT AND TURN BLADE BACK TO ORIGINAL POSITION (MARKINGS)!

No blade shake at all is allowed on MTV-27-1-()-J propellers with additional blade preload system.



The MTV-27-1-()-J propellers have a preload bearing installed at the blade ferrule. The preload bearing nut is equipped with 3 grease fittings to re-apply grease in the preload bearing.

Every 300 hours or 6 months (whatever comes first) remove 1 of the 3 grease fittings.

Pump MT2 - Propeller Grease in the 2 remaining grease fittings until grease is coming out at the position where the grease fitting is removed (see Figures 1 and Figure 2).

Pump in the grease until fresh yellow grease is coming out of the removed fittings.

After adding grease in the 2 fittings re-install the grease fitting which was used for inspection when the grease was coming out of the preload bearing.

This procedure should be performed to ensure enough grease in the preload bearing to avoid any corrosion in the preload bearing.



Figure 1



Figure 2

Beta Coordinator and Beta Tube:

Check for corrosion on beta coordinator and beta tube.

In case corrosion is found, remove corrosion by polishing with some sand paper and apply a sticky grease every 100 hours to avoid further corrosion.

- 6.2.1** 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.

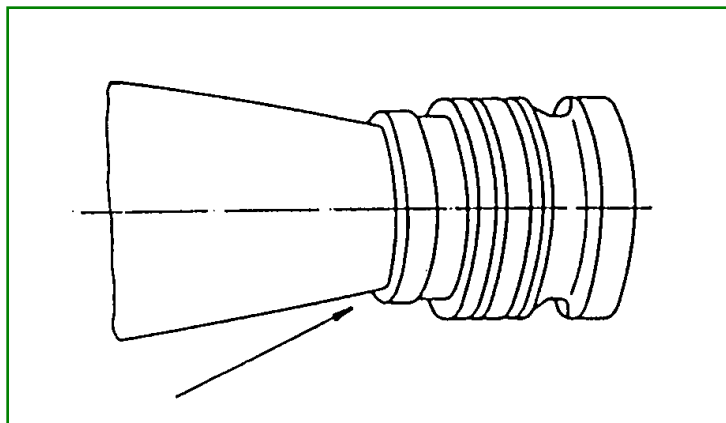
Cracks in the painted surface are allowed as long as no moisture can enter the blade core. Blisters or delamination up to 1 square inch are permissible.

In case of questionable conditions please contact the service department of MT-Propeller.



6.2.1 Check Composite Blades: continued

Illustrations of Possible Cracks in the Blade



- Figure 2 -

Check that the silicone, sealing the blade to the blade ferrule, is not damaged (see Figure 2). If a damage is obvious, repair that no moisture can enter into blade body and blade ferrule.

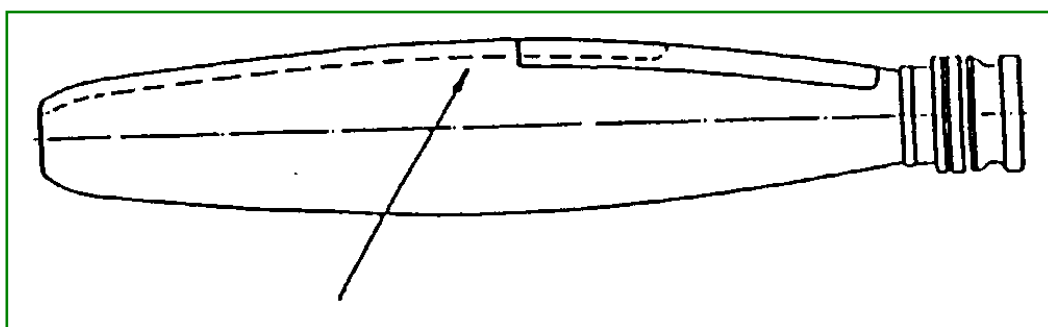
Perform visual inspection in case of notches, dents, nicks or other damages to the blade body (for example stone nicks).

If no cracks exist, fill void with an appropriate Epoxy resin (5-Minute Epoxy or Sikaflex-221). 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.



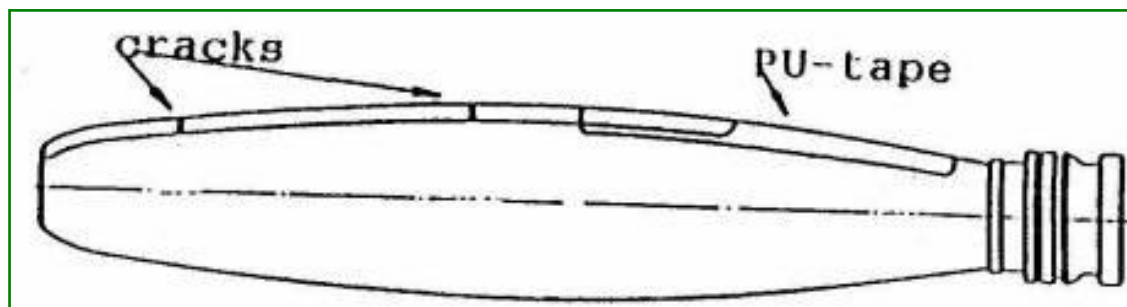
- Figure 3 -

Possible cracks along the metal erosion sheath (see Figure 3).

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.



6.2.1 Check Composite Blades: continued



- Figure 4 -

Cracked erosion sheath requires immediate repair (see Figure 4).
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 inches x 0,24 inches do not repair! Change erosion sheath!

6.2.2.2 Pointed Dents:

More than 0,24 inches x 0,24 inches 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 inches of each other! Otherwise, blade must be repaired)

6.2.2.5 Erosion

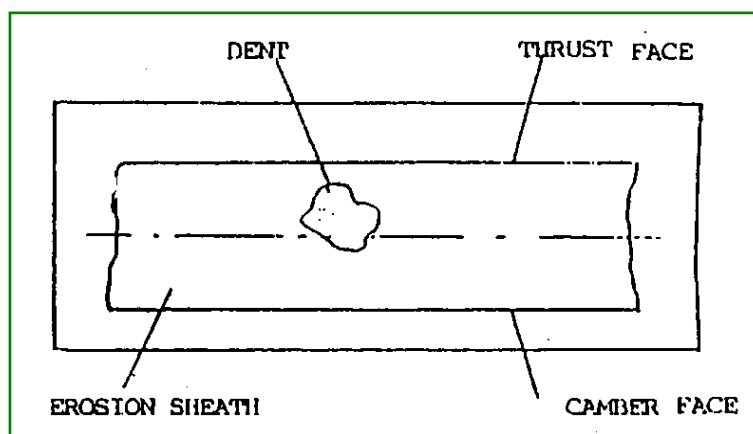
6.2.2.6 Lightning Strike



- 6.3** In case of any impact as mentioned under item 6.2.2.1 (Circular Dents; see Figure 5) check whether it penetrates through the erosion sheath. If not, fill dent with Epoxy and grind off until there is a smooth surface.

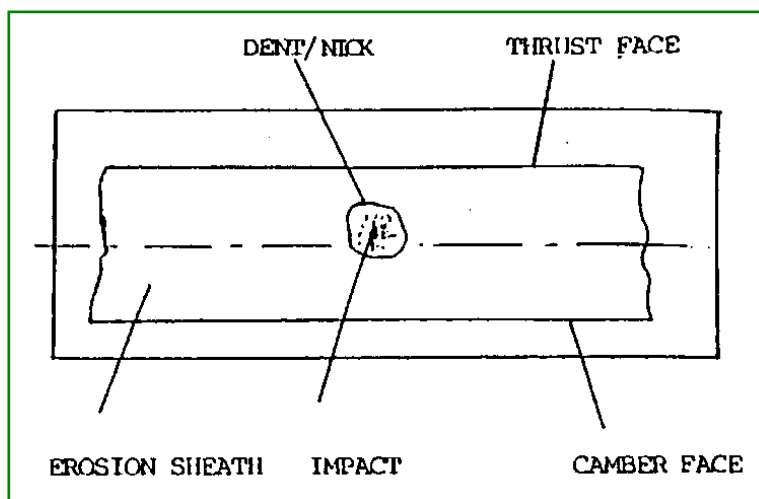
NOTE: EPOXY MAY BE APPLIED FOR COSMETIC REASONS BUT NOT "MUST BE DONE".

Check this area carefully for possible cracks whenever performing pre-flight inspection. Erosion sheath may remain until next repair/overhaul will be done.



- Figure 5 -

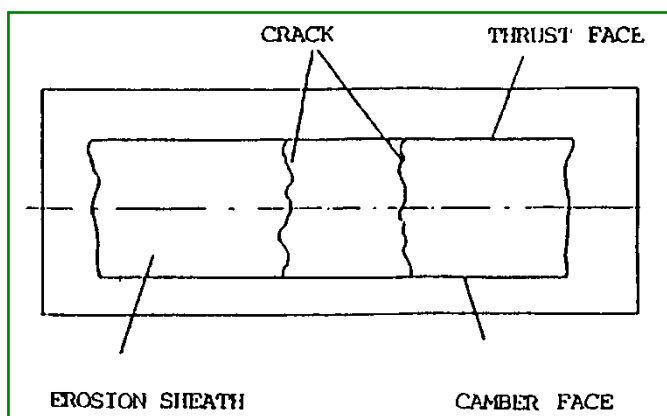
- 6.4** In case of impacts in the erosion sheath (as mentioned under item 6.2.2.2 (see Figure 6) the sheath may possibly be penetrated. If not, proceed as described under item 6.3. If yes, check erosion sheath for possible cracks. If there are no cracks, the dent must be filled with Epoxy so that no 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.



- Figure 6 -

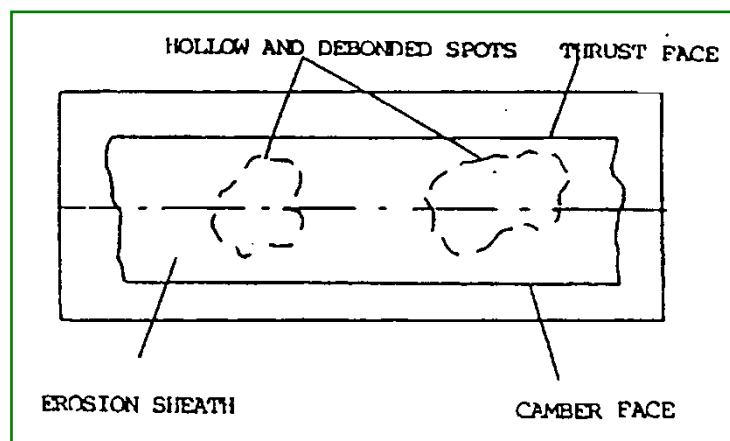


- 6.5** If there are any cracks (as mentioned under item 6.2.2.3; see also Figure 7), the erosion sheath must be replaced as soon as possible. The propeller is to be returned to the manufacturer or to an authorized service station.



- Figure 7 -

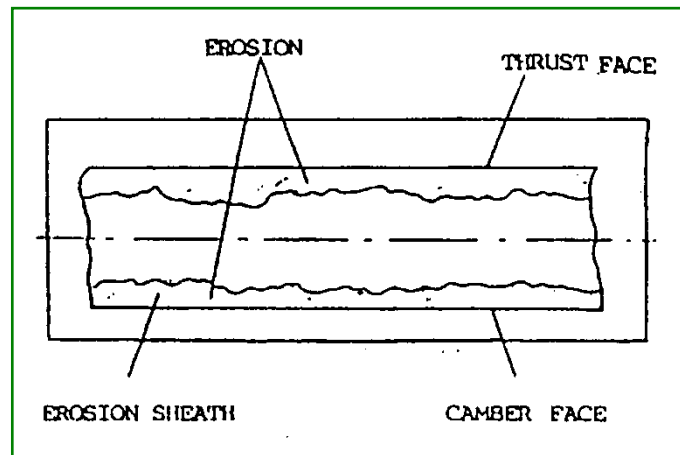
- 6.6** If any hollow and debonded spots exist (as mentioned under item 6.2.2.4; see Figure 8), mark them. Whenever performing pre-flight inspection, monitor whether there are further delamination and/or whether the already existing delamination becomes worse. The inspection can be executed by using an appropriate coin (Tap-Test; see also Figure 12 on page 24). 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.



- Figure 8 -



- 6.7** The erosion mentioned under item 6.2.2.5; see Figure 9, 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 and 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.



- Figure 9 -

6.8 BLISTERS AND DELAMINATION

Are blisters or delamination visible, mark them and check them periodically. Blisters from sap (resin) shall be opened to release the material. Fill void with 5 Minute Epoxy or Sikaflex-221 and sand. Larger delamination 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 or Sikaflex-221 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 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).



6.11 PU-EROSION PROTECTION TAPE

If the PU-tape at the inner portion of the blade is damaged or does not exist anymore, replace it immediately (max. 2 hours). This can be done by a qualified person. If electrical de-ice-boots are installed, no PU-tape is used.

6.12 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.

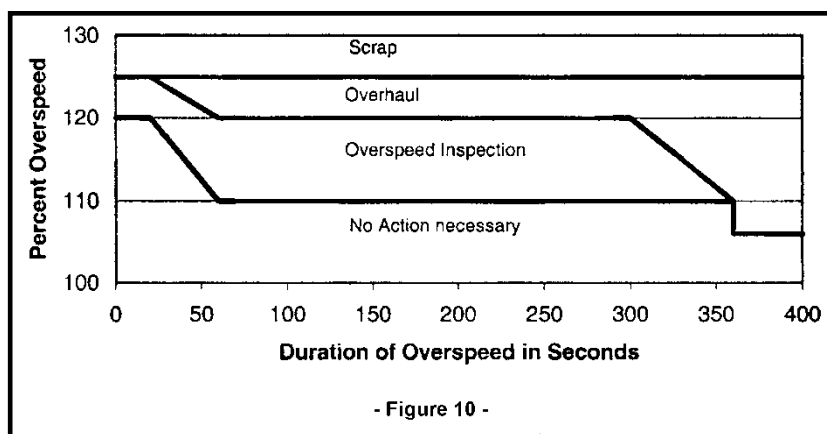
6.13 SPECIAL INSPECTIONS

Special inspections might be required on new installation without approved engine/propeller combinations.

Kind and extent of a special inspection are shown in the propeller log book. Consult MT-Propeller, if you have questions.

6.14 OVERHAUL

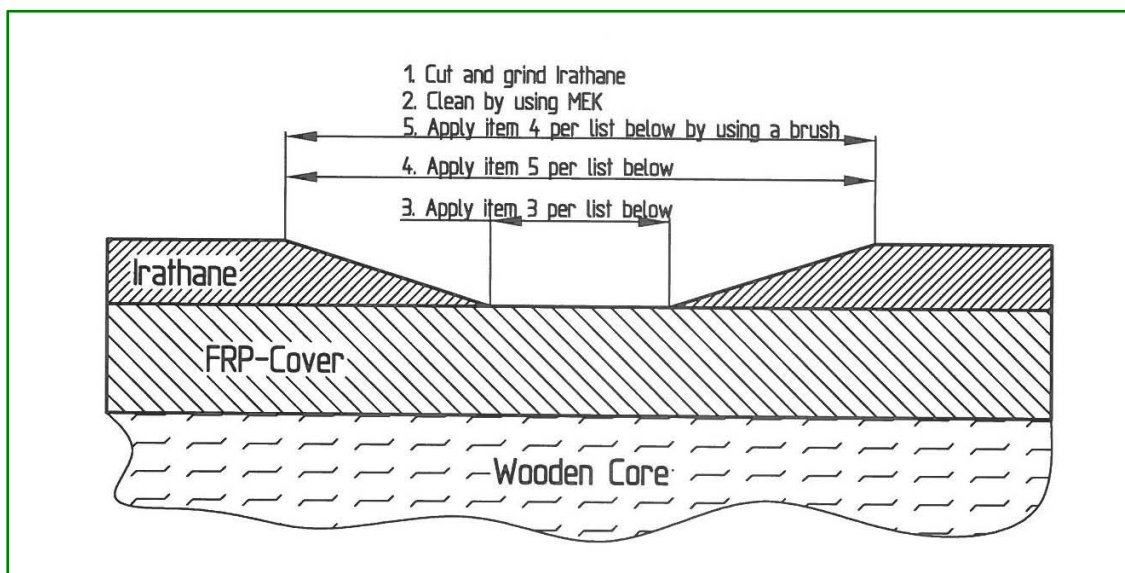
The time between overhauls is expressed in hours flown and calendar months since manufacture or overhaul. The figures are presented in Service Bulletin No. 1(), latest Revision . They are also shown in the propeller log book. In any case, a calendar time inspection must be performed after a maximum of 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.





6.15 REPAIR OF IRATHANE COATED BLADES

Surfaces with sharp cuts from particles which opened the Irathane coating must be repaired at the next possibility according to the figure below.



Preliminary, minor repairs on blades may be done with sealing compound until there is time to use Irathane.

Material for Repair of Irathane Coated Blades:

Items	Products	
1.	Coloradol or MEK	Cleaner
2.	PR1221A2	Sealing Compound
3.	Feycopur 610, 2KPU Feycopur 11 or 13 110602 or 110601	Primer Grey Hardener Universal Thinner
	<u>Or alternatively following Sherwin Williams components may be used:</u>	
	483-790 129-790 110-944	Epoxy Primer Epoxy Adduct Thinner
4.	Irabond	UU55/52A
5.	Irathane 155: Part A P155 + Part B C155	Anti-Erosion Coating
6.	Black Paste 1105	(to be mixed with Irathane for black top coat)

Attention:

Damage protruding into the fiber covering may be repaired in field only up to 3 cm².

Damage through the fiber covering into the wood are acceptable for in-field repairs only up to 0.5 cm².

The leading edge protection has to be replaced before the inner steel sheeting becomes porous by erosion.



6.16 OVERSPEED / OVERTORQUE

When a propeller, installed on a turbine engine, has an overspeed event, refer to the Engine Overspeed Limits (Figure 10) 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 overspeed 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 to the degree of damage, make a log book entry to document the overspeed event.

6.17 CORRECTIVE ACTION

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

6.18 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.



6.19 OVERSPEED INSPECTION

An overspeed 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.

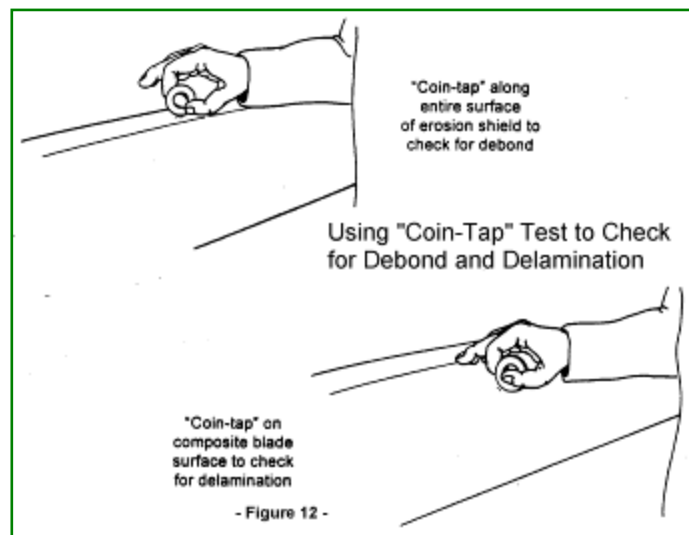
Special attention must be given to blade retention components.

Aluminum Hubs

Visually inspect the blade retention area of the blade socket.

Composite Blades

Perform a thorough visual and coin tap inspection (see Figure 12) of the exposed portion (de-ice boot removal not required) of each blade including the stainless-steel leading edge.



6.20 OVERHAUL

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

Attention:

In case of a blade damage by a foreign object an overhaul is always required.

6.21 SCRAP

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



6.22 SPECIAL CORROSION INSPECTION AND TREATMENT

For aluminum painted blade ferrules, see Fig. 1 inspect the surface for corrosion. The pictures below show an example of possible the affected locations. The level of corrosion which is pictured by the example is not affecting the function of the propeller or the strength. Just clean the corroded locations with an oily towel and lubricate them with protective grease.

For the counterweight body, also inspect for corrosion. On the affected areas shown in Fig 2, clean the corroded locations with an oily towel and lubricate them with protective grease.

Frequently inspect the corroded areas and as applicable re-grease.

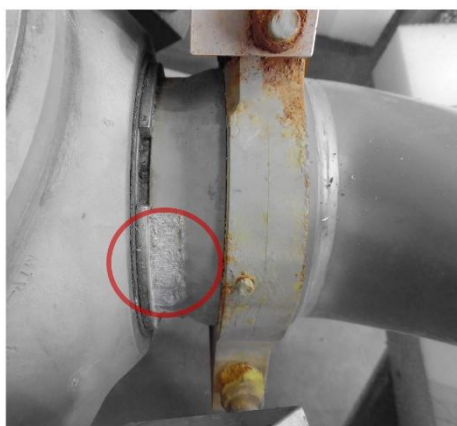


Figure 1



Figure 2

Please send a picture of the affected areas to the technical support of MT-Propeller – techsupport@mt-propeller.com for information and evaluation.

For metal parts protection it is recommended to apply Duralac Green Anti-Corrosive Jointing Compound.



NOTE: IF THE PROPELLER IS MAINTAINED AND INSPECTED ACCORDING TO THIS CHAPTER 6, THE TBO IS NOT AFFECTED.



7. MAINTENANCE

7.1 There is no special maintenance schedule for these 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.

7.1.1 Re-greasing of the preload bearing of the removable blade models every 300 hours or 6 months (whatever comes first).

7.1.2 It is strongly recommended to wash the propeller system at least once a day with freshwater before the Hovercraft is parked for a longer time, like overnight. This will reduce the corrosion on the propeller and its components a lot. Washing can be done with a normal water hose.

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 rebalanced.

7.6.2 Inspection procedures prior to balancing
On propellers with in-field-removable blades check blade position in the outer ferrule.
No movement is allowed, otherwise reset according to item 5.4.1.

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

NOTE:

EVENTUAL GREASE LEAKS ON PROPELLER SURFACE:

THE FIRST RUN-UP OF A NEW OR OVERHAULED PROPELLER MAY LEAVE GREASE ON THE BLADES AND INNER SURFACE OF THE SPINNER DOME.

THIS IS NORMAL AND DO NOT MEAN THAT IT WILL BE A CONTINUING GREASE LEAKAGE.

REMOVE ANY GREASE ON THE BLADES OR INNER SURFACE OF THE SPINNER DOME BY USING A MILD SOLVENT.

MINOR GREASE LEAK WHICH CAN BE SEEN ON ONE OR ALL BLADE ROOT(S) AND SPINNER SHOULD BE MONITORED IF IT GETS WORSE.

IF THE GREASE LEAK DOES NOT SPRAY MORE THAN 7 INCHES (18 CM) ON THE BLADE SURFACE FROM THE BLADE ROOT OUTSIDE THE BLADE FERRULE IN 5 HOURS OF OPERATION, IT IS DEFINED AS MINOR AND SHOULD BE ONLY MONITORED!

CONTINUED GREASE LEAKAGE AFTER 20 HOURS OF OPERATION FROM FIRST LEAKAGE REQUIRES REPAIR AT AN AUTHORIZED SERVICE REPAIR FACILITY WITHIN 5 OPERATING HOURS.

IN CASE OF DOUBT, CONTACT MANUFACTURER.

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.
On MTV-5, MTV-27 and MTV-27-1-()-J propeller systems the balance weight is installed directly at the propeller hub threads.

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.



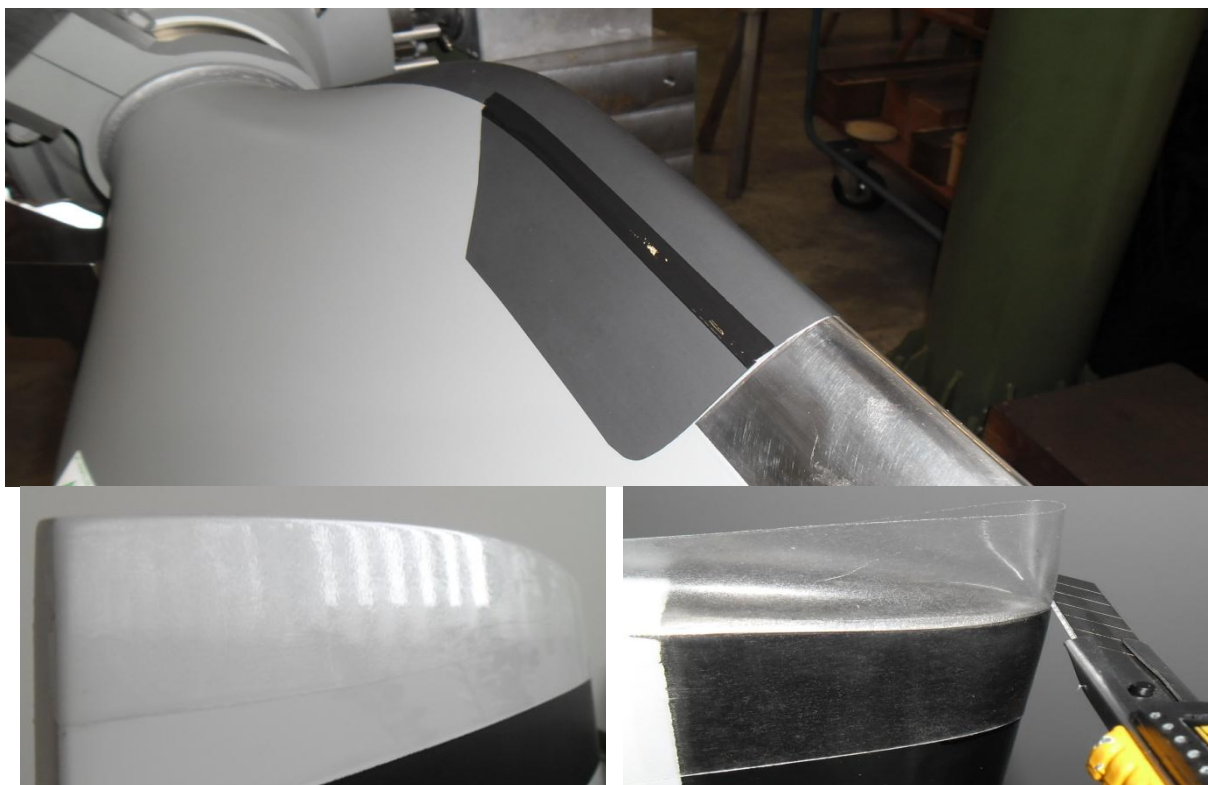
7.6.3 Placement of balance weights for dynamic balance

- 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 32 g or 100 g for rpm lower than 1500.
- 7.6.3.5 Weights are to be installed using aircraft quality 10-32 inches 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.



7.7 PREVENTION OF EROSION CAUSED BY SEA WATER

Installation of Protective Polyurethane Protective Tape on Hovercraft Blades for protection against erosion caused by sea water as technical approval.



Affected Propeller:

MTV-5-1-W-C-R(H)/CRLD199-117
MTV-27-1-X-C-R(H)/CRLD218-121d
MTV-27-1-V-C-R(H)/CRLD258-121b
MTV-27-1-YZ-C-R(H)-J/CRRD350-132a

Required Material:

- C-110-A Polyurethane Protective Tape (3M 8663HS MATTE BLACK) according to drawing B-631-X-B
- C-111-A Polyurethane Protective Tape (3M 8672 Transparent Erosion Tape) with a width of 5 cm (1.97 inch)
- Bostik 1096 (CM37) or 1300L De-Icing Glue (CM31) for VITON Protective Tape Installation
- Sikaflex-221 (black) or (SCOTCH-SEAL 800-AF with black paint)

Expandable Material:

- Clean Lint-Free Cloths
- Cleaning Solvents, Shellsol 100/140 or similar
- Adhesive foil
- Cutter knife

**NOTE:**

**APPLICATION OF PROTECTIVE POLYURETHANE TAPE MUST BE PERFORMED AT OR ABOVE 16° C (60°F).
HANDS MUST BE KEPT CLEAN AT ALL TIMES!**

- 7.7.1** Purpose
Description of the installation of Protective Polyurethane (PU) Tape on MTV-5\27 Hovercraft blades.
- 7.7.2** Basics
The PU tape must be installed to prevent erosion due to water between the blade root and the erosion sheath and at the blade tip section.
- 7.7.3** Work Routine

WARNING:

DO NOT CLEAN ANY MT-PROPELLER PART WITH STEEL BRUSH, OTHER METAL BRUSH, HARD BRISTLE BRUSH, OR TOOL OF ANY TYPE NOT SPECIFIED.

Carefully use Shellsol 100/140 or similar on Lint-Free Cloths to clean the blade. Be careful not to remove or damage the painting.

- 7.7.3.1** Installation of the leading edge protection tape
- Fit the middle section from the Polyurethane Protective Tape Blanks [1] (drawing B-631-X-()) between the erosion sheath and the blade ferrule according to the following notes. Cut the PU tape if necessary.
 - Remove the adhesion protection [2] from the tape blanks [1] (drawing B-631-X-()).



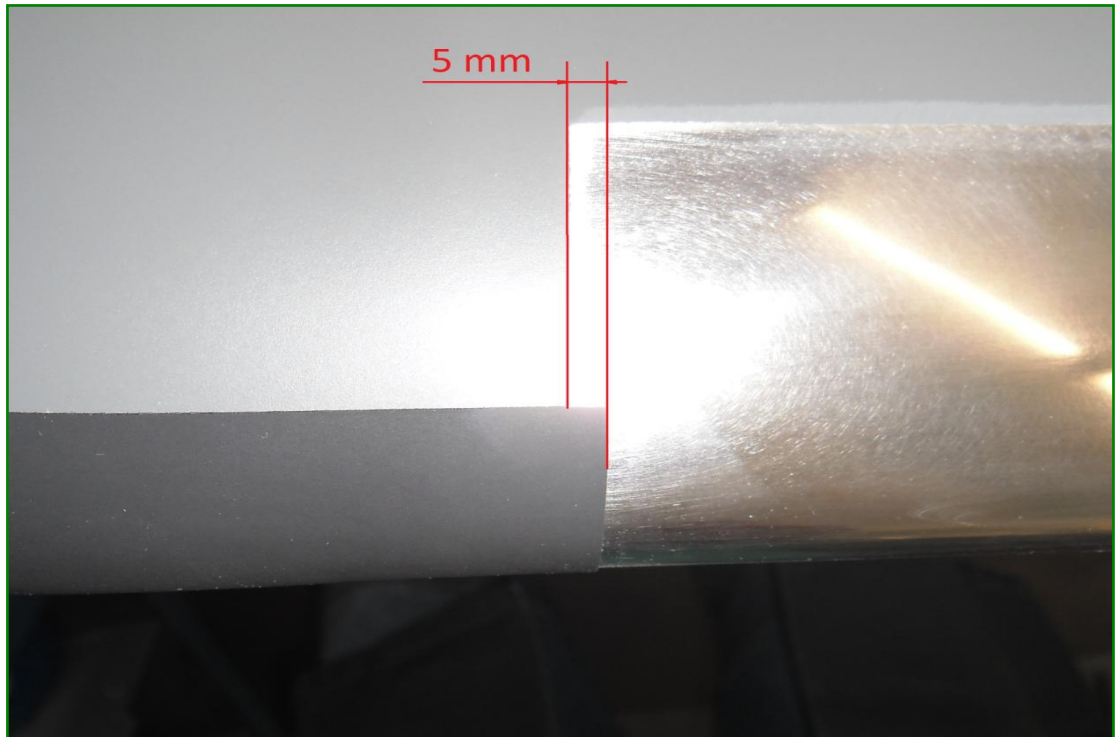
[1] PU tape blanks



[2] Adhesion protection

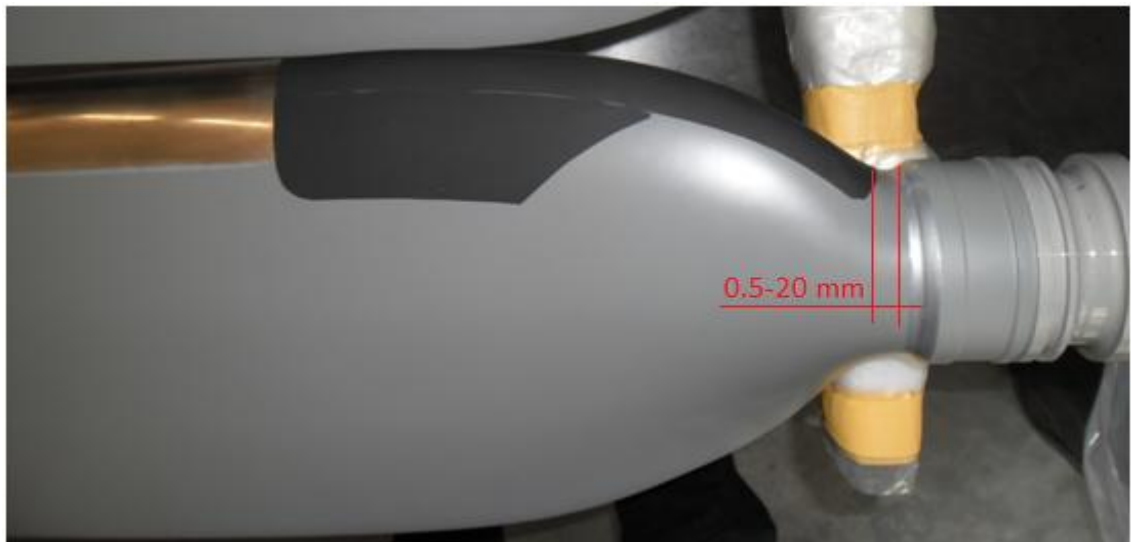


- Glue the middle section on the blades as seen in picture [3]. Let the PU tape overlap above the erosion sheath about 5 mm (0.197 inch). Between the blade ferrule and the PU tape should be about 0.5 and 20 mm (0.0197 and 0.7874 inch) distance [4]. Cut the PU tape if necessary.



[3] Middle section

- Glue the two side sections as close as possible to the middle section without overlapping [4].



[4] Side section

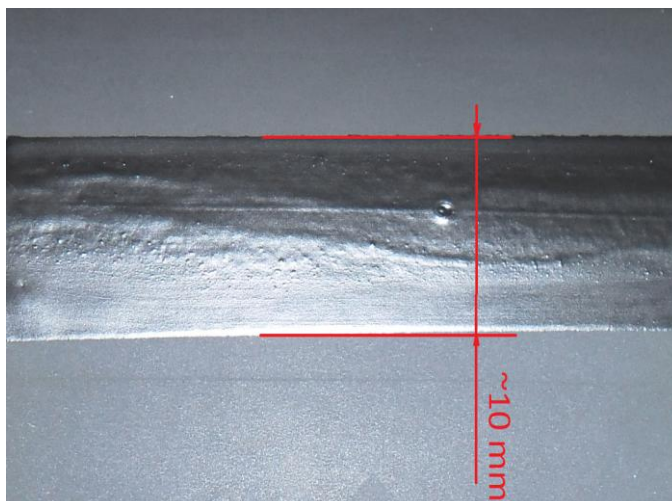


- Use Sikaflex-221 (black) to seal the two gaps between the middle and the side sections as shown in picture [5].

Mask the joint of the two layers by appropriate means to approximate 10 mm (0.393 inch) before application.

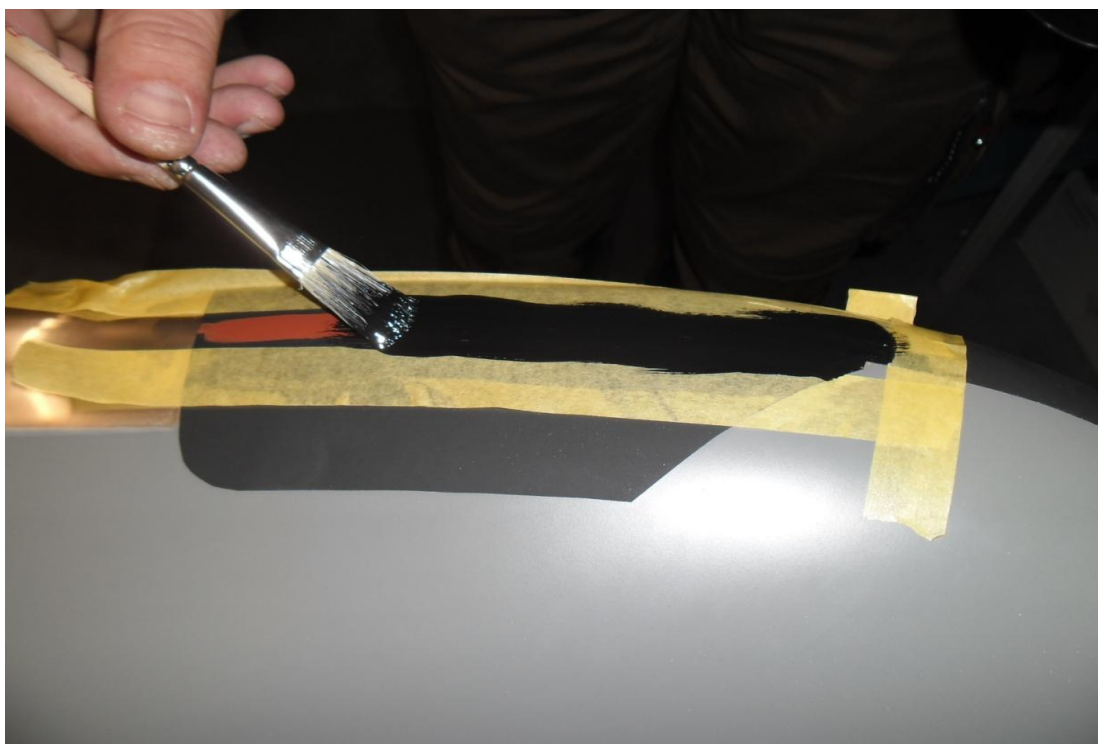
Allow both the Sikaflex-221 (or similar) as also the paint if used to air dry according to the respective data sheet of the manufacturer.

If Sikaflex-221 is not available, SCOTCH-SEAL 800-AF or similar can also be used and be painted with black color [6].



[5] Sealed gaps

- Do not forget to remove the mask tape used to install the PU tape.



[6] Black paint over colored seal

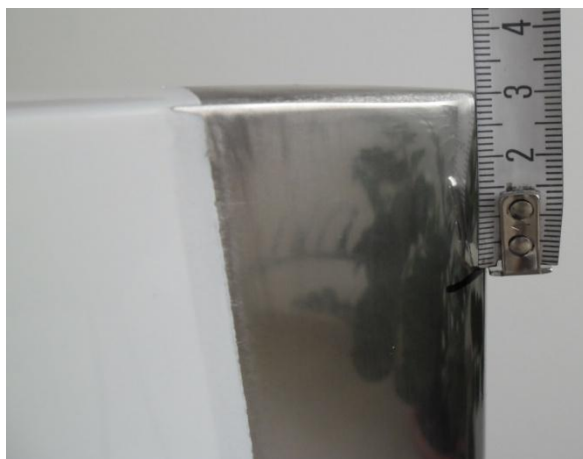


[7] Finished installation of the Protective PU Tape Blanks

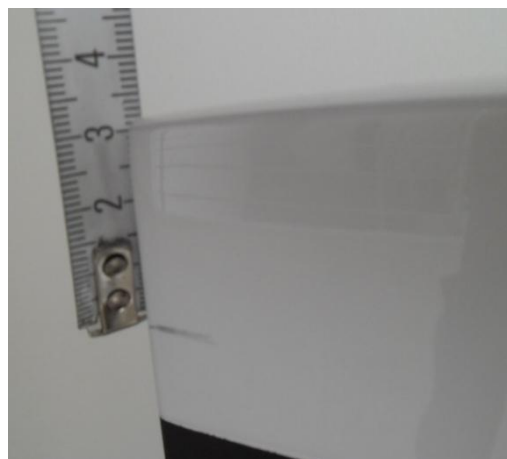
7.7.3.2 Installation of the Blade Tip Protection Tape

- First mark the leading and the trailing edge at 30 mm (1.181 inch) from the blade tip. Therefore use a soft, water soluble pencil or something similar.

Be careful not to damage the painting!



[8] Marking of the leading edge



[9] Marking of the trailing edge



- Cut a strip from the C-111-A Polyurethane Protective Tape (3M 8672 Transparent Erosion Tape) according to the following table:

Table [1]: Required length of C-111-A tape stripes

<u>Blade type:</u>	<u>Length of C-111-A tape stripe:</u>
MTV-27-1-YZ-C-R(H)-J/CRRD350-132a	640 mm (25.20 inch)
MTV-27-1-V-C-R(H)/CRLD258-121b	800 mm (31.496 inch)
MTV-27-1-X-C-R(H)/CRLD218-121d	800 mm (31.496 inch)
MTV-5-1-W-C-R(H)/CRLD199-117	600 mm (23.62 inch)



[10] and [11]: Cutting the tape according to *table [1]*

- Stick the C-111-A tape stripe on the blade from the trailing edge around the leading edge to the trailing edge as seen in picture [12]. Start at the trailing edge and wrap it around the leading edge without cutting it. Stick the tape little above the marking so that you are able to polish it afterwards.



Do not cut the tape stripe at the leading edge!



[12] and [13]: Sticking on the tape stripe

- Use a sharp knife and carefully cut the tape as shown in picture [14]. Overlapping both at the tip as at the trailing edge is not required. Also no tape is required at the trailing edge plain and at the blade tip plain.



[14] and [15]: Cutting the tape stripe

- Do not try to remove air bubbles by pricking into them with a sharp object to avoid damage of the painting.
- Remove marks with Shellsol 100/140 or similar.



7.8 INSTALLATION OF ADDITIONAL NICKEL LEADING EDGE PROTECTION ON IRATHANE PAINT

7.8.1 Removal of the additional Leading Edge Protections in case already installed damaged!

Tools:



Additionally needed tooling: gutter, gripper, screw driver (minus), sand paper!

Procedure:

Use a cutter or mortise chisel to get a first loose part of rubber!

Carefully try to peel the rubber from the Irathane coating!

Take care not to damage the coating!





Use A screw driver to loosen up the Leading Edge Protection.



In case of Irathane damage or damage of the FRP by doing this work, this has to be repaired before any new leading edge protection will be fixed gluing procedures can be started!



Remove the erosion strip if necessary!



Use sand paper to take off the glue residue!



Clean the surface with MEK!



7.8.2 Preparation

Each leading edge protection is preformed nickel vulcanized on a special rubber for a special position on the blade tip.

7.8.3 Blade Preparation

Position the leading edge protection on the blade tip, ensuring a 0,5 mm extension over the blade tip.

Secure it in this position using masking tape!

Secure in this position using masking tape!

Apply masking tape along the leading edge protections.



WARNING:

**MEK (METHYL ETHYL KETONE) WEAKENS THE PAINT OF THE PROPELLER BLADE AND THE SEALING.
USE A CLOTH DAMPENED WITH SOLVENT.**

Slightly roughen the bonding surface of the leading edge protections.

Clean the bonding surface of all parts (the strips, the blade and sheet) using MEK.



7.8.4 Gluing the Leading Edge Protections

Glue: AY 105- 1 (Araldite Resin) / Hy 991 (Araldite Hardener) called Araldite.

NOTE:

IF TIME IS NOT AVAILABLE TO INSTALL THE STRIPS WITH ARLADITE, TRULOC SUPERSET 45 CAN BE USED AS AN ALTERNATIVE. THE CURING TIME FOR THIS ADHESIVE IS ONLY MINUTES.



- a) Thoroughly mix Araldite (if applicable) per instructions given on the cans.
Apply an even coat to both bonding surfaces, the blade and the leading edge protection.



- b) Assemble the first leading edge protection to the blade, ensuring a 0,5 mm protrusion at the blade tip and secure it in this position;

- c) Remove excessive glue by pressing. Using tape, ensure a good adhesion on the face and camber side.





After gluing all the leading edge protections use the prepared wood sticks for additional pressing the rims to the blade and fix them with a tape.

Fill the 0,5 mm overhand with Araldite.

Air dry for 24 hours minimum at +20°C.

Remove masking tape, clean surfaces and check for sound bond.

7.8.5 Sealing the Blade

As necessary, apply masking tape along the edge of the erosion strips, leaving a 8 mm gap and apply filler JFM 801 B2 to finally seal the edges.

Remove masking tape directly after finishing this work!



Allow to dry before returning the propeller to service!



7.9 RETORQUING THE ADDITIONAL PRELOAD SYSTEM ON THE MTV-27-1-()-J PROPELLERS

Retorque the blades according to the following procedure:

Necessary Tools:



Qty	Item	Part No.
1	Spring Scale	
1	13/16" flat wrench	
1	Ratch with 7/8 nut	
2	10mm flat wrench	
1	Removal tool for anti-rotation pin	T-710-1
1	Socket wrench	
1	Counterweight Pliers	T-824
1	Hammer	
1	Punch	
1	Retorque Device	T-551-12
1	Rod with length of 1 meter	
4	Anti-rotation safety plate	A-1380-1
	Silicone RTV 109 or similar	



First loosen the stop nut of the counterweight and remove the screw from the counterweight.



Mark the position of the anti-rotation pin on the counterweight and memorise the position of the counterweight in reference to the blade.

Then remove the pin with the tool (T-710-1).





Move the counter-weight in direction to the blade until it is flush with the blade ferrule as shown in the picture.

ATTENTION: Do not damage the paint on the counterweight, otherwise put paint on again to avoid corrosion.

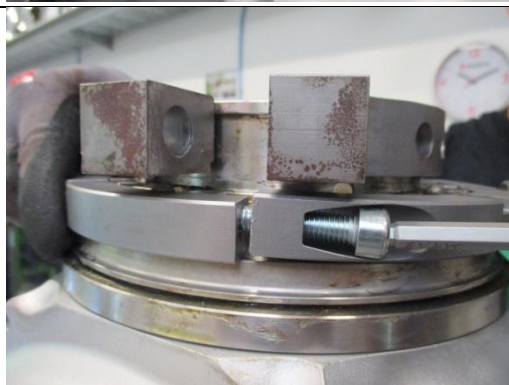




Now remove the 2 anti-rotation safety plates.
Remove the silicone around the preload nut.

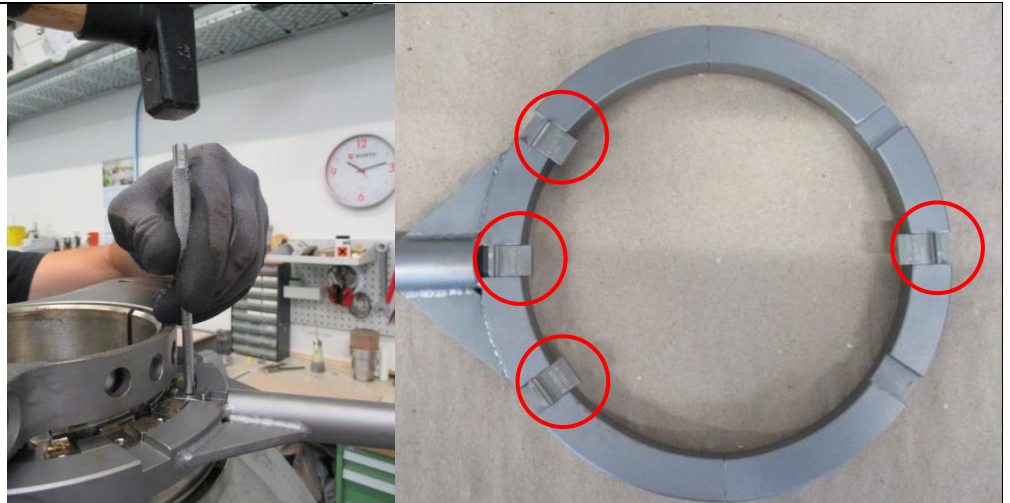


Install the Retorque Device (T-551-12) around the preload nut but do not tighten the screws yet.





Place 4 anti-rotation safety plates (A-1380-1) in the Retorque Device on the positions as shown in the picture.

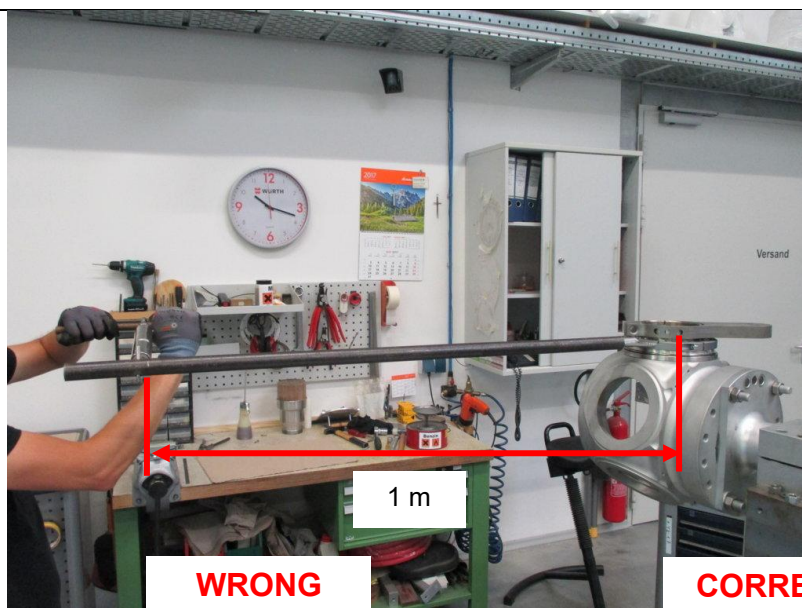


Tighten both screws on the Retorque Device to have a play free seat on the nut. Make sure that the Retorque Device is contacting the flat surface of the preload nut before tightening the 2 screws on the Retorque Device.

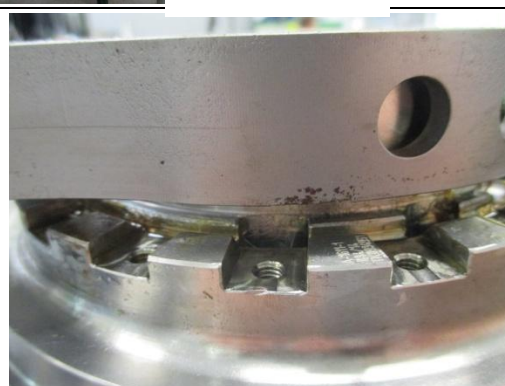




Apply a force of 300 - 500 N (67 - 112 lbf) at a distance of 1 m (3.28 ft) using a rod and a spring force to measure the force. The preload of the nut should be 300 - 500 Nm (221 - 369 lbf) target for 400 - 500 Nm (295 - 369 lbf).



Turn the preload nut until the groove of the preload nut and the outer blade ferrule overlap. Then reinstall the 2 anti-rotation safety plates.



Seal the anti-rotation safety plates with Silicon RTV 109 or similar as shown in the picture. Only apply silicone next to the safety plate but not onto it.





In case the silicone between the preload plate and the hub is damaged apply additional Silicone RTV 109 or similar for sealing.



Move the counterweight onto the preload nut again. Reinstall the anti-rotation pin in the counterweight. Install the screw in the counterweight and torque with the specified value shown in chapter 5.4.1. Seal the blades as described in chapter 5.4.1 in Figures 1 to Figure 3.



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.

No movement at all is allowed on MTV-27-1-()-J propellers with additional blade preload system. In case of movement return propeller to the factory or any approved repair station.

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 system 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 pitch stops in the propeller
3. Abrupt movement of propeller or throttle control
4. Instrumental error

Remedy:

1. Clean oil tubes in the propeller piston and eventually in the beta valve and beta tube
2. Compare pitch values to those of the data sheet.
Note static rotational speed.
3. Move the controls carefully and slowly.
4. Check tachometer and drive.



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

- Cause:
1. Oil leakage or hot oil
 2. Worn oil transfer system on the beta -valve causes an increase in blade angle for counterweighted propellers and a decrease in blade angle for none-counterweighted propellers.
 3. Supply pressure failure.

- Remedy:
1. Check for oil leaks, replace gaskets, decrease oil temperature.
 2. If the system works with cold oil and fails at high oil temperature, this will indicate high leakage in the oil transfer system in the Beta-Valve. Repair Beta-Valve.
 3. Check pump drive on the test bench.

8.5 EXTREMELY SLOW PITCH CHANGE OR NO PITCH CHANGE ON GROUND

- 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 beta-valve
 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.

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

8.6 OIL LEAKAGE (VISIBLE OUTSIDE OR HIDDEN INSIDE)

- Cause: Damaged seals.

- Remedy: Replace gaskets or repair propeller.

8.7 ROUGH RUNNING ENGINE / PROPELLER, POSSIBLY IN LIMITED RPM RANGE ONLY

- Cause:
1. Bad static balance.
 2. Bad dynamic balance.
 3. On propellers with removable blades check marking whether the blade has not rotated in outer blade ferrule.

- 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. Reset according to item 5.4.1.



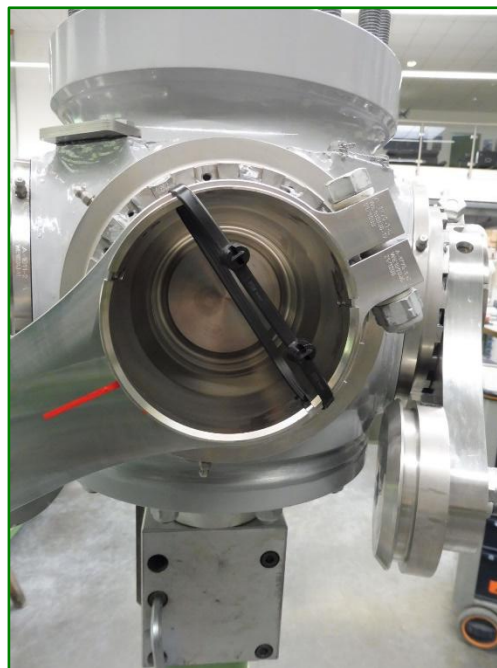
9. SHIPPING AND STORAGE

- 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.

Attention:

After removal of blades do not torque counterweights, just tighten them lose and fix with a ty-rop to avoid movement. By this no bending of the inner blade ferrule and therefore irreparable damage can occur.



- 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.



9.8 ACCEPTANCE CHECKING

Examine the exterior of the shipping container for signs of shipping damage, especially at the box ends around each blade. A hole, tear or crushed appearance at the end of the box (at the propeller tips) may indicate the propeller was dropped during shipment, possibly damaging the blades.

After removing the propeller from the shipping container, examine the propeller components for shipping damage.

9.9 UNCRATING

Place the propeller on a firm support.

Remove the banding and any external wood bracing from the cardboard shipping container.

CAUTION: Do not place the propeller on a blade tip!

Put the propeller on a padded support that supports the entire length of the propeller.

Remove the plastic dust cover cup from the propeller mounting flange, if installed.

9.10 LIFTING

For lifting, take the propeller as near as possible on the blade ferrule.

Do not take the propeller at any other area, especially on the blade tip or the spinner backplate.

10. SPECIAL TOOLS

None



11. AIRWORTHINESS LIMITATIONS SECTION

No Airworthiness Limitations!

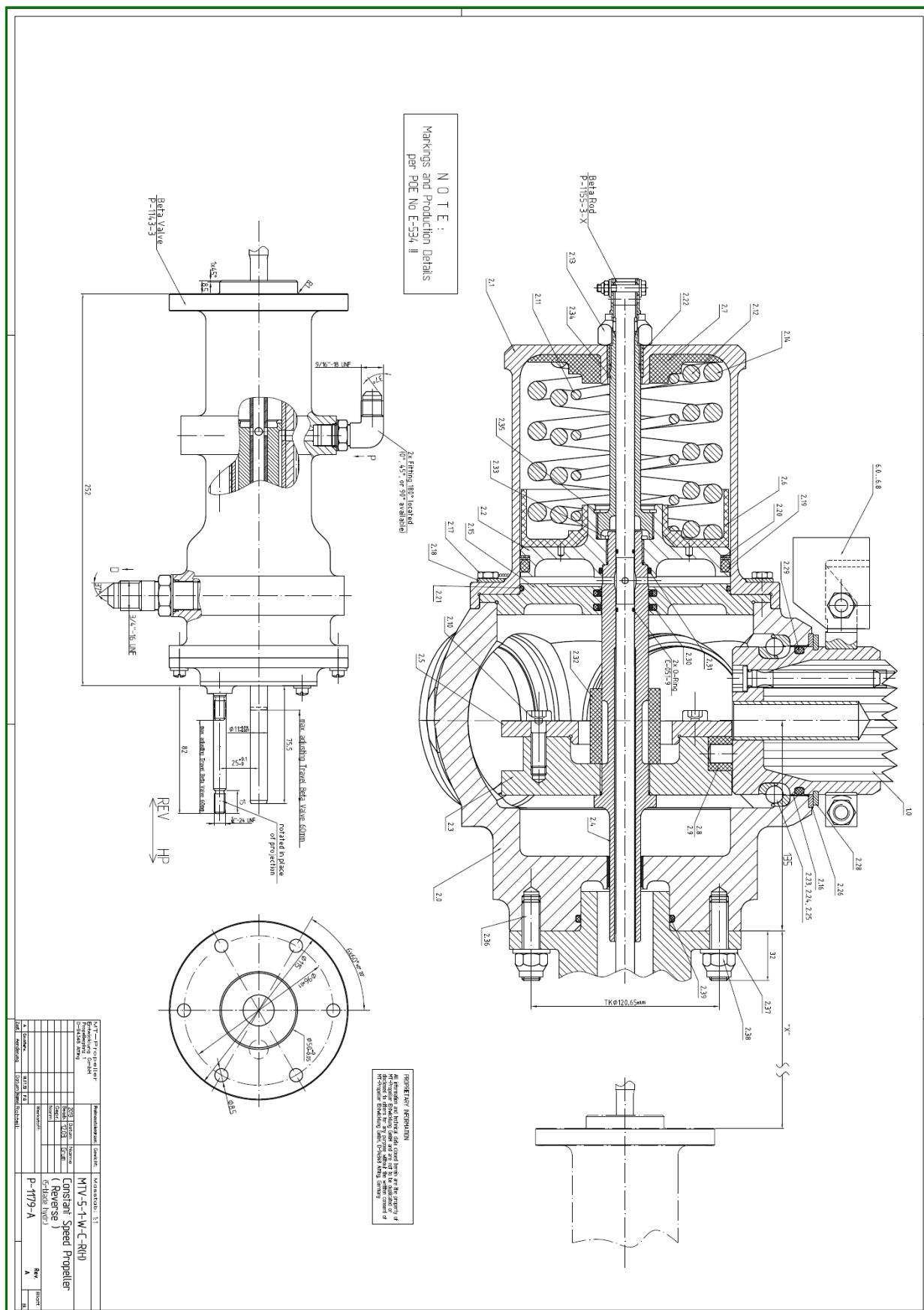
This Airworthiness Limitations Section (ALS) is EASA approved in accordance with Part 21A.31(a)(3) and CS-P40(b) and 14 CFR Part 35.4 (A35.4) and JAR-P20(e). Any change to mandatory replacement times, inspection intervals and related procedures contained in this ALS must also be approved.

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



12. PROPELLER DRAWINGS

12.1 PROPELLER DRAWING **MTV-5-1-W-C-R(H)**
Drawing No. P-1179-A



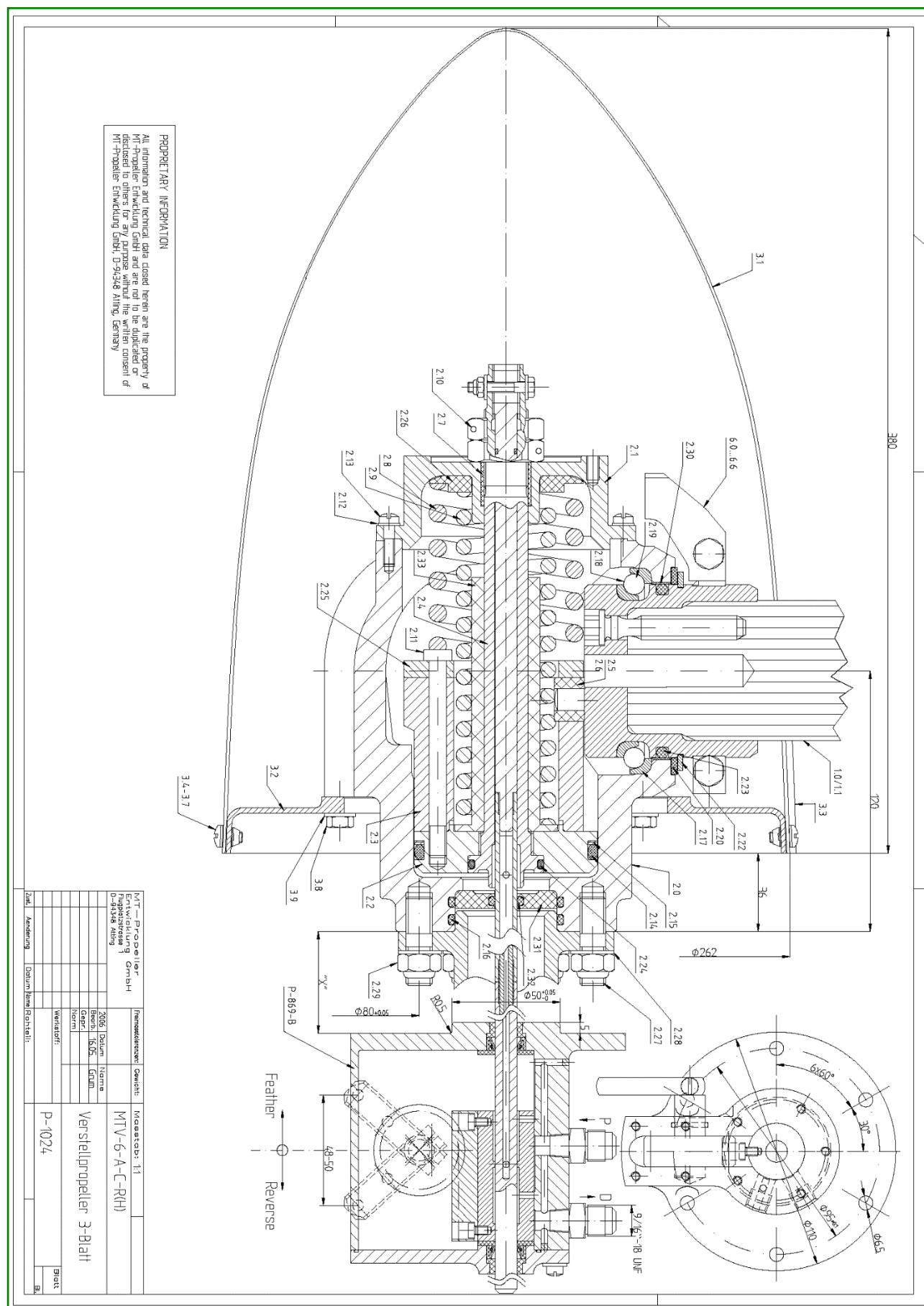


12.2

PROPELLER DRAWING

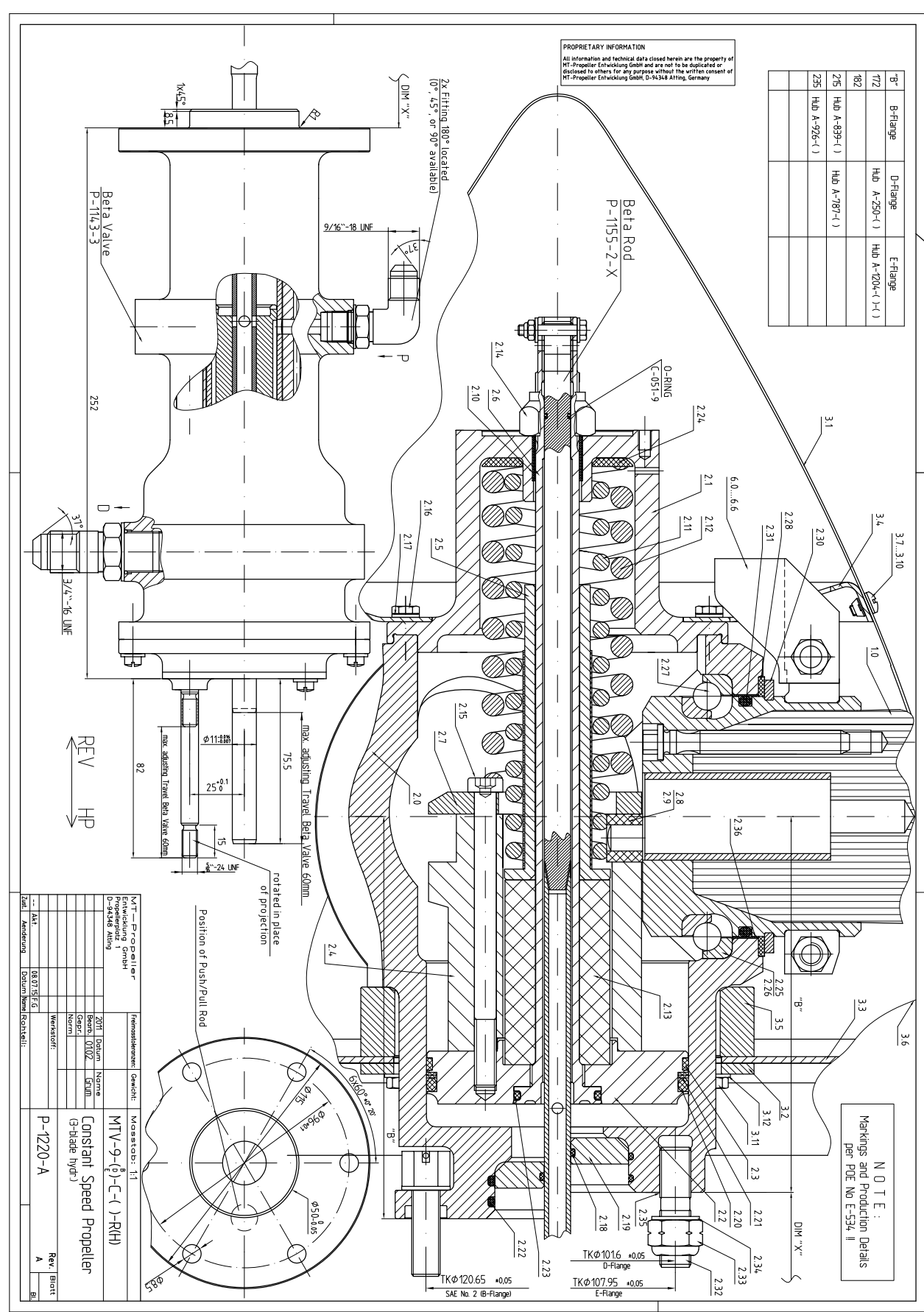
Drawing No. P-1024

MTV-6-A-C-R(H)





12.3 PROPELLER DRAWING MTV-9-(B,D,E)-C-()-R(H)
Drawing No. P-1220-A



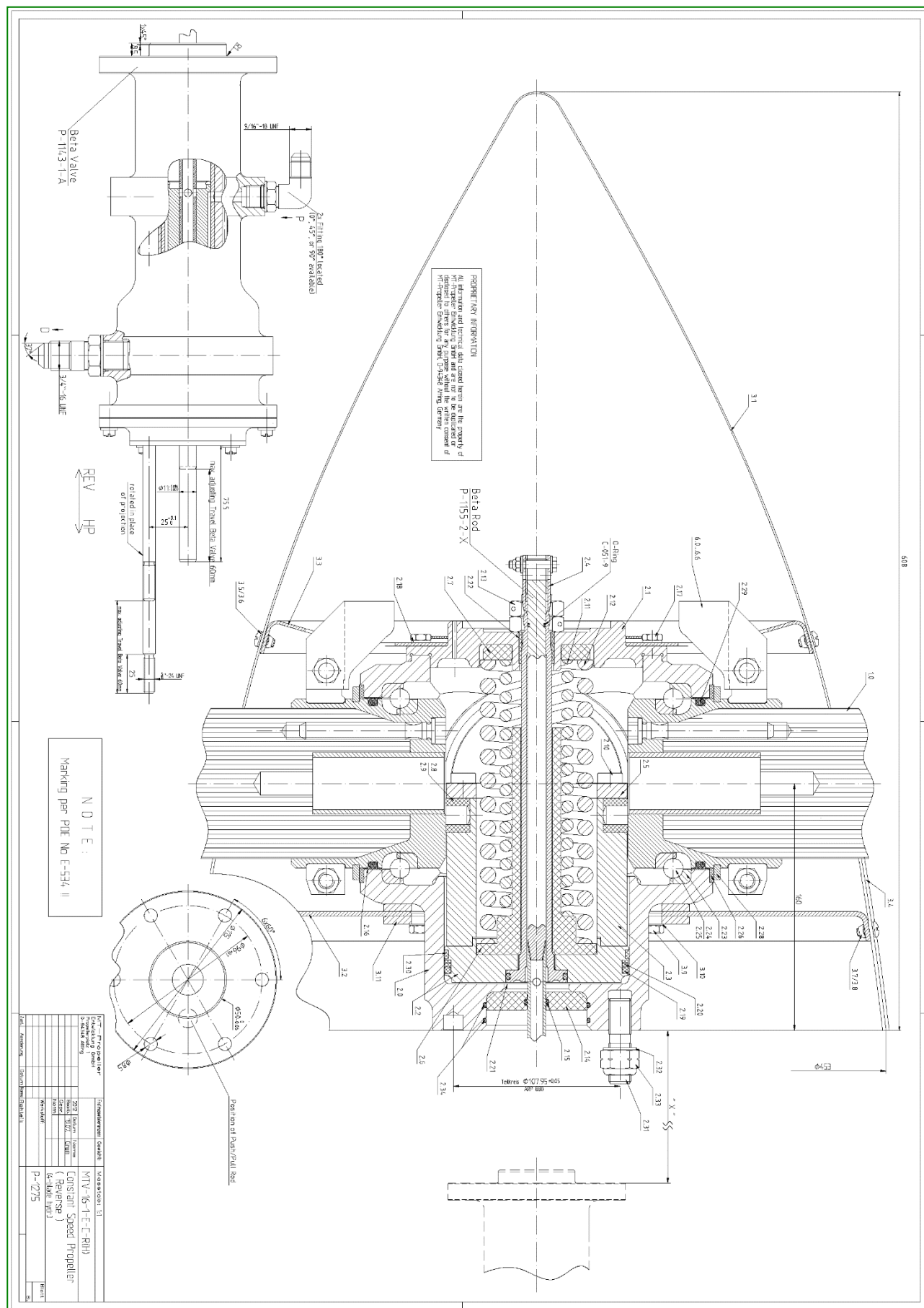


12.4

PROPELLER DRAWING

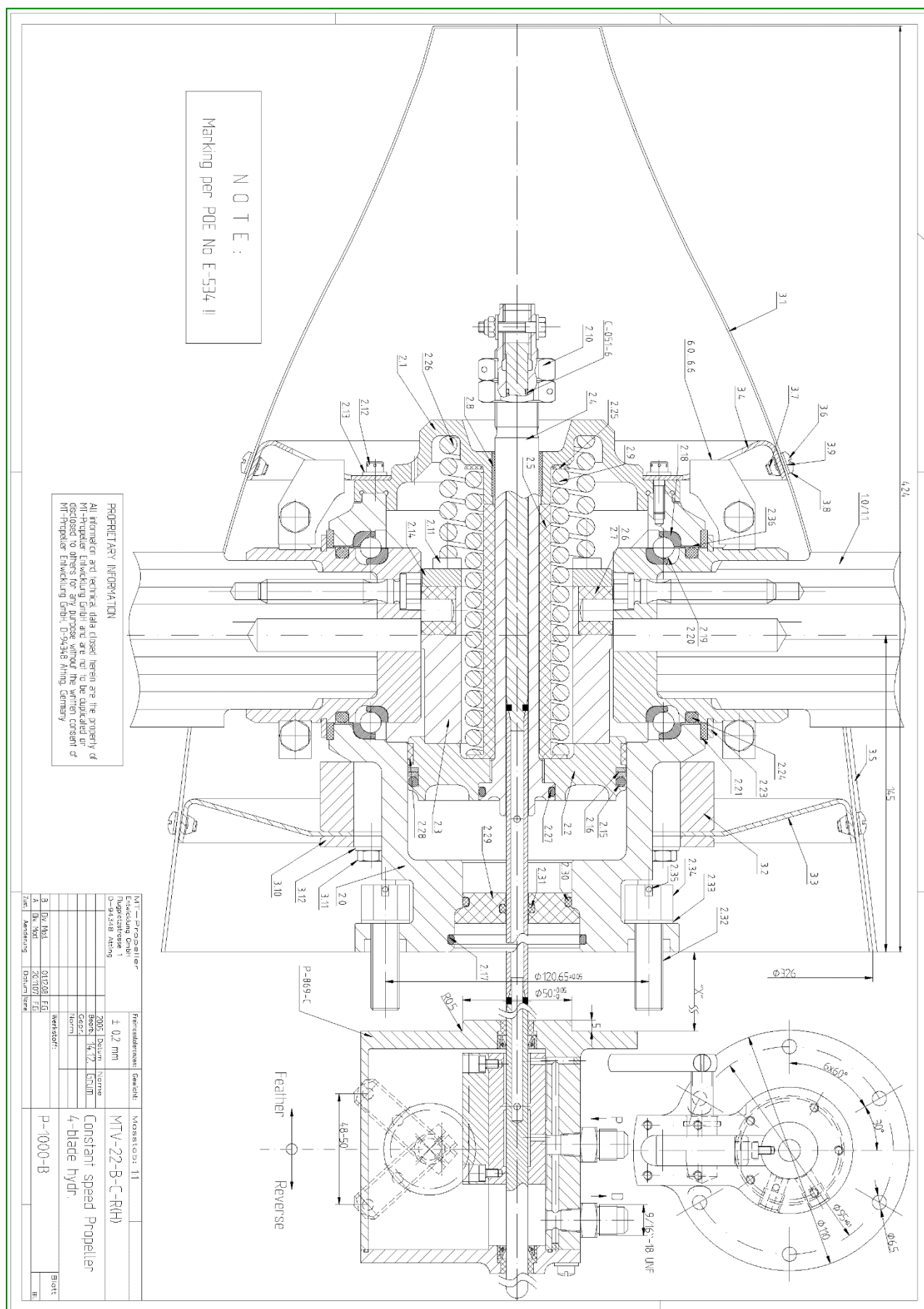
Drawing No. P-1275

MTV-16-1-E-C-R(H)





12.5 PROPELLER DRAWING MTV22-B-C-R(H)

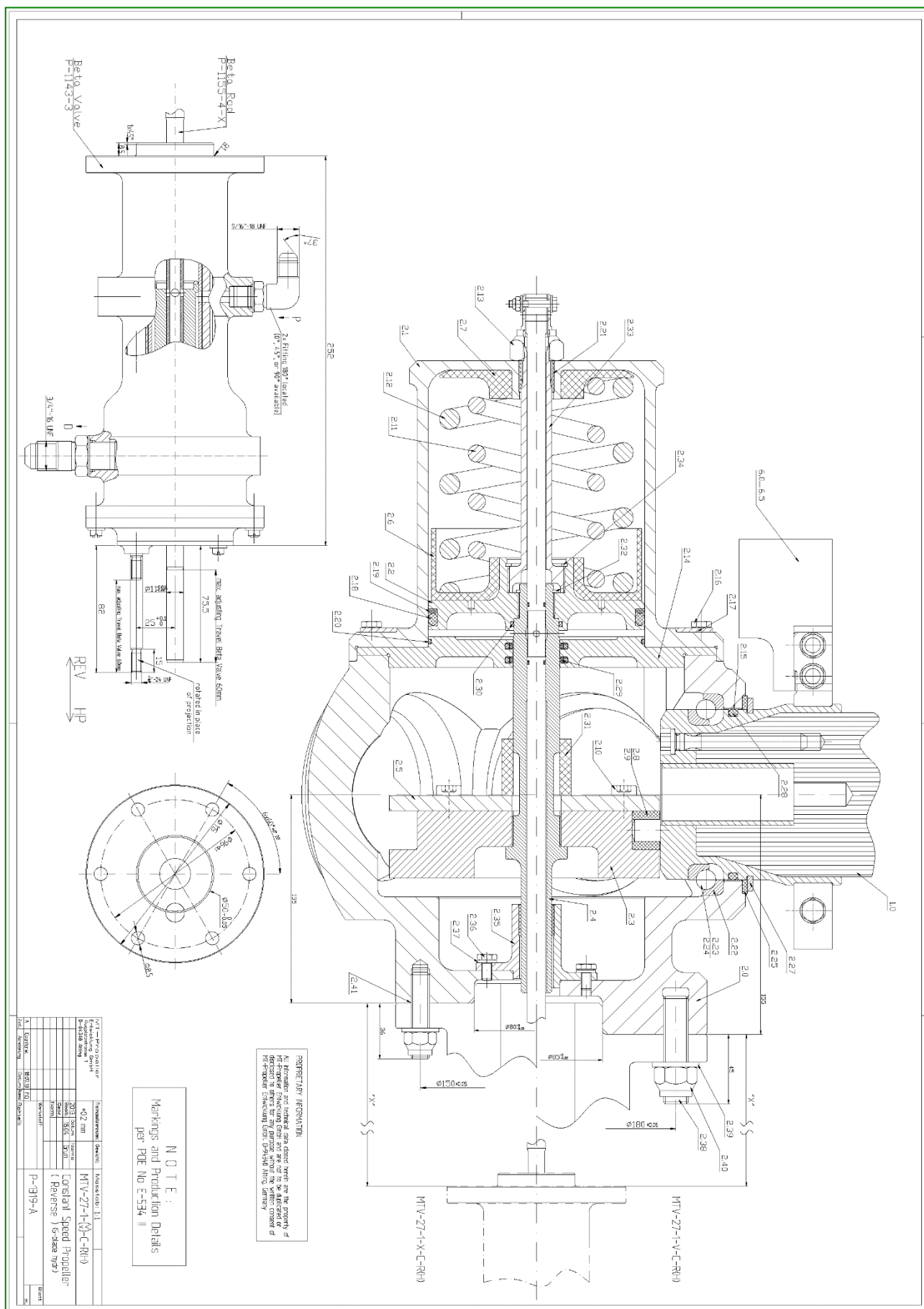




12.7 PROPELLER DRAWING

Drawing No. P. 1319-A

MTV-27-1-V-C-R(H) AND MTV-27-1-X-C-R(H)





12.8 PROPELLER DRAWING: MTV-27-1-YZ-C-R(H)-J

Drawing No. P-1142-C

