Replace the defective power net

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**
  IN THE HUB:

Check for any loose connections at the power net (Pos: G401).

Check input and output voltage 230/115VAC /24VDC

If defective replace the power net.

Part number for power net:

Relevant spare parts	
Description	**Item No.**
PS ADC 5483R-3 10A-27,4 NM PIN	188453

Relevant CIM case		
CIM case	**Task list**	**SWI**
1390		

Perform the blade calibration as per the WKI

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**
  IN THE Nacelle:

  Do the blade calibration. Original calibration may be altered during component replacement, such as position sensors (Balluf), cables, proportional valves and hub computer.

DMS: 0000-9925 section 5.10.9 Blade Position Calibration during manual pitching in the Nacelle Mode.

Relevant documentation	
Description	**DMS No.**

Commissioning instructionV82 -1.65-Mk4	0000-9925

Also refer to Blade Pitch System Test

Relevant documentation	
Description	**DMS No.**
WI - Blade Pitch System Test	0002-0467

Replace the defective Pitch position sensor and defective cables

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**

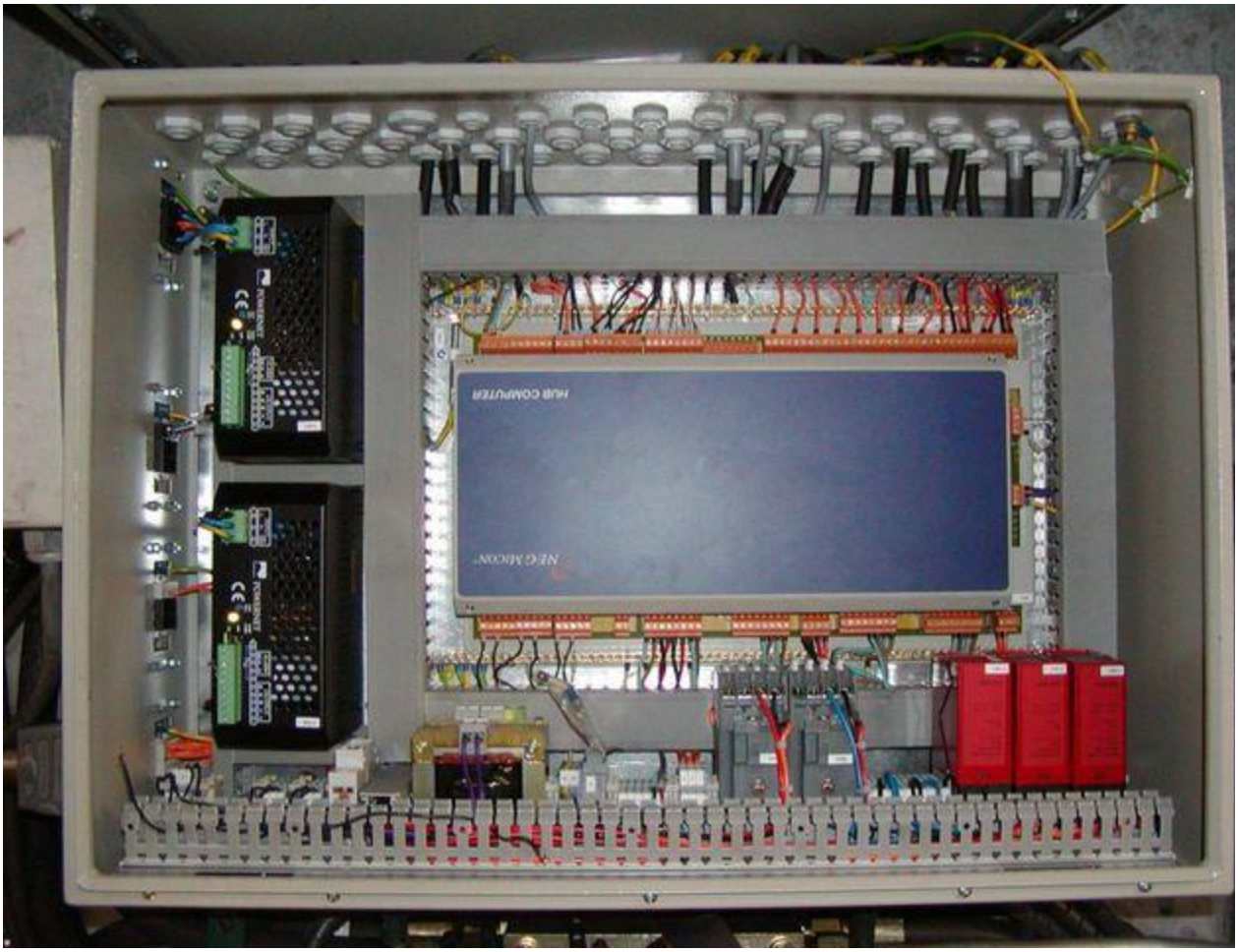
IN THE HUB :

Check for any loose connections in the hub computer terminal X19.

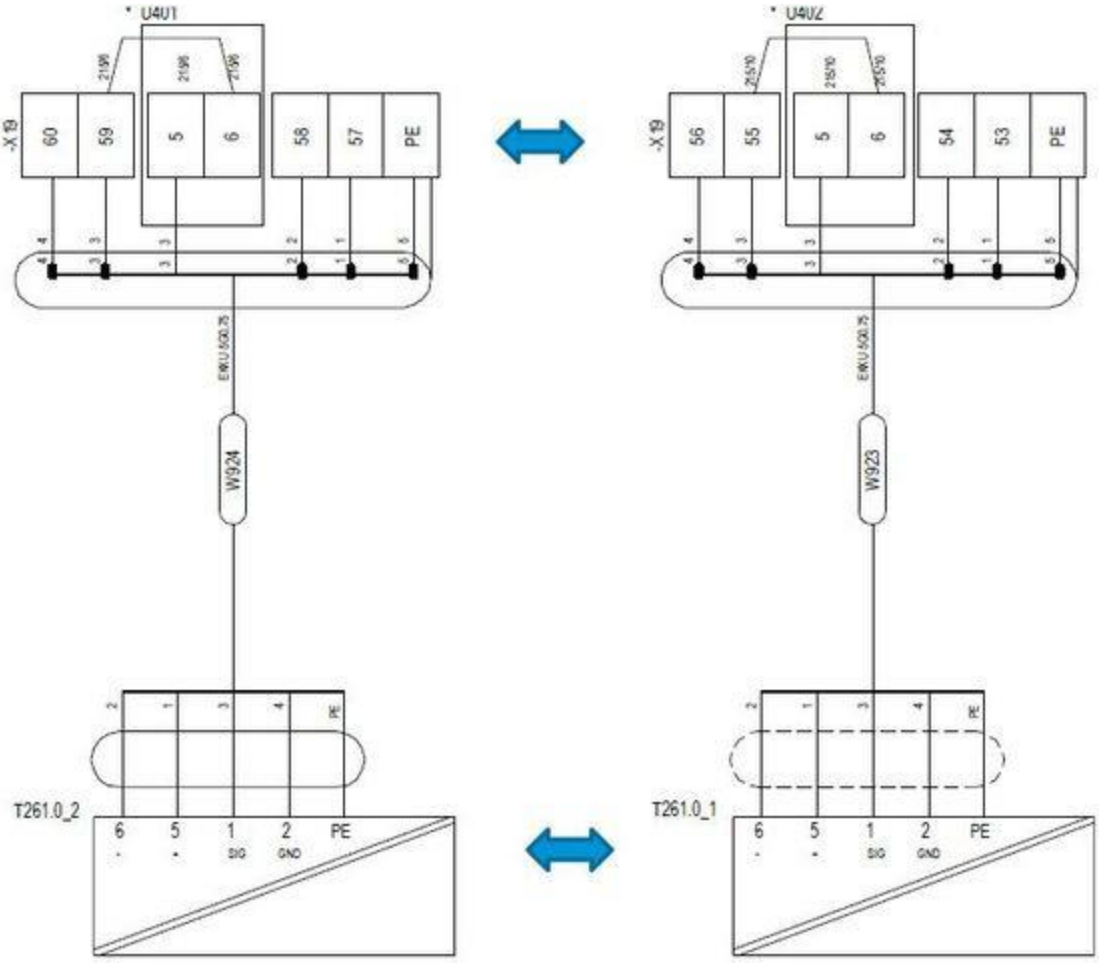
Check for any loose connections on the Blade position sensor.


BALLUFF
BTL5-E10-M0950-A-SA211
-S135
071215573 HU

Swap the signal wire to the position transducer (Balluff) on the hub computer. If the fault follows to the new blade then the fault is either in the position transducer or one of the cables.



In the example below, we are swapping the plugs between blades C and B.



Place the cables back to their original position and then swap pitch position sensor from affected blade to another working blade.

If the alarm follows the valve to the other blade, the pitch position sensor is defective.

If it does not, the pitch position sensor is likely not the cause.

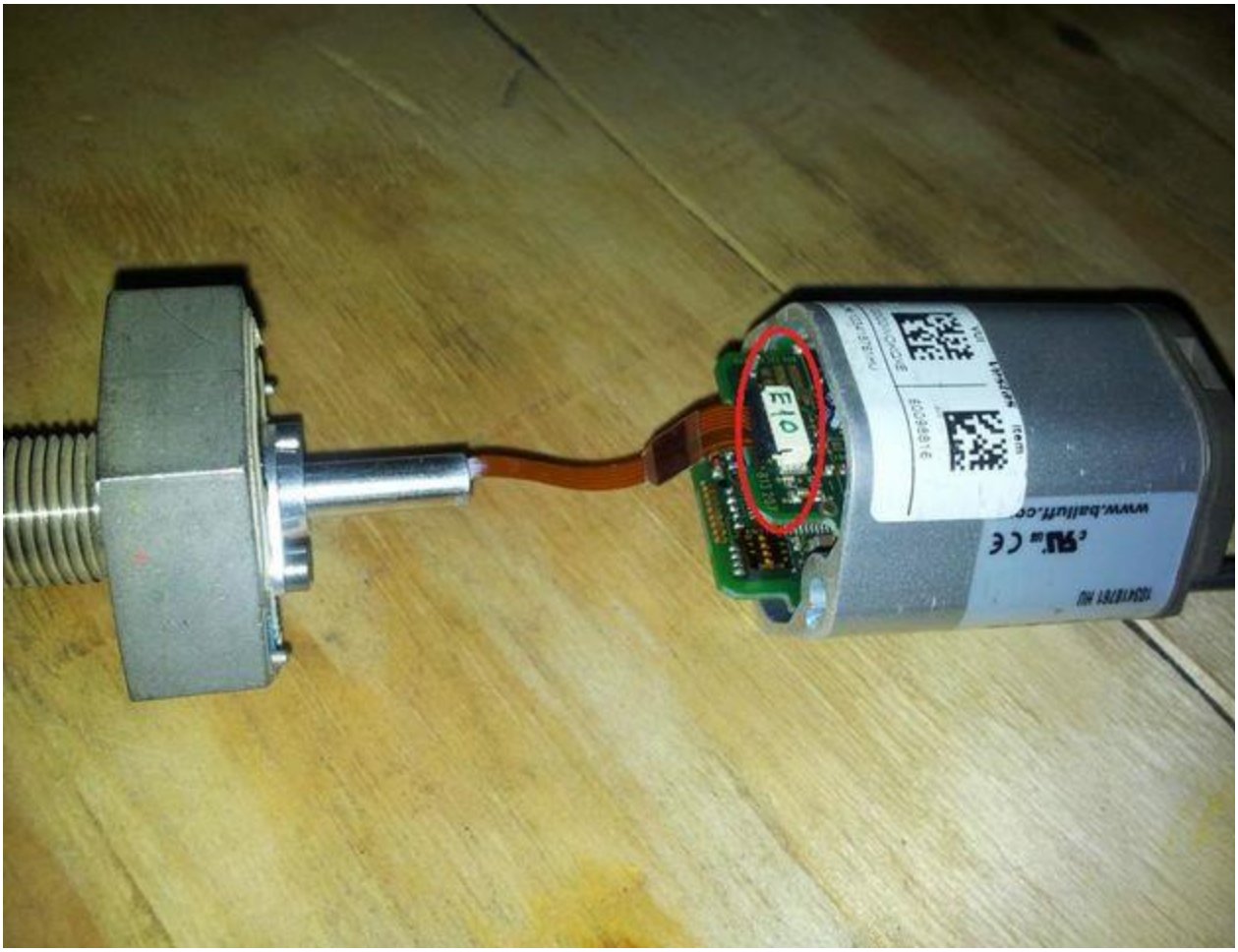
Pitch position sensor Item number :

Relevant spare parts

Description	Item No.
TRANSDUCER BTL5-E10-M0950-A-S	60098816

Service Module Item Number :

Relevant spare parts	
Description	**Item No.**
SERVICEMODUL, BTL5 - E10	60102394



Check the cable for any or short due to the cable rubbing near the hub casting or friction between the cable and the hydraulic hose.

Replace any defective cables.

Pitch position sensor cable Item Number:

Relevant spare parts	
Description	**Item No.**
CABLE W923 T261 1 P	60101018
CABLE W924 T261 2 Pos.	60101148

CABLE W925 T261 3 Pos.	60101149

Check the blade bearing greasing system and replace the failed components

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**
  IN THE HUB:

Manually operate the grease pump from the controller.

Check that the grease reaches all lubrication points on all blades.

Service Instruction for Lubrication Unit for Blade Bearings

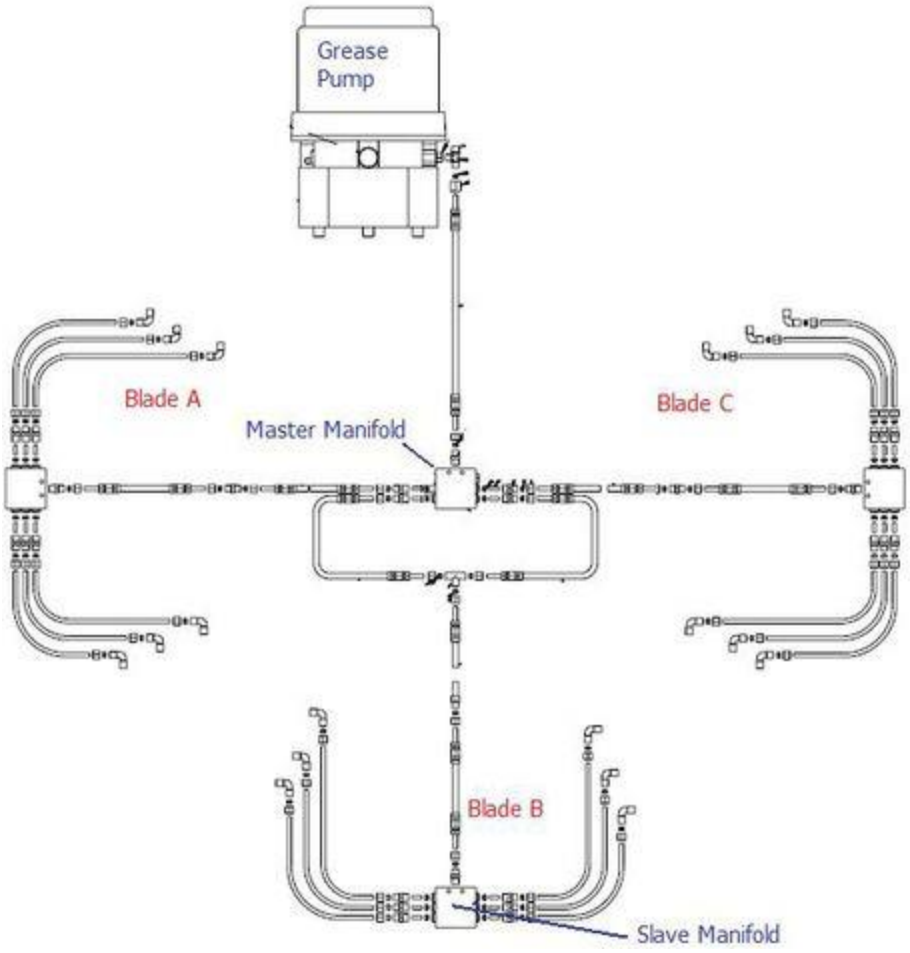
Relevant documentation	
Description	**DMS No.**
SI_Auto lub for blade bearing NM82	1001450

Check that the grease flows from all of the ports:

Inspect for any damaged hose fittings, manifold grease blockage or hose damage.

If necessary replace the manifolds and hoses.

Blade bearing greasing system:



Part number details for Blade bearing Greasing system:

Relevant spare parts	
Description	**Item No.**
GREASE PUMP P203 std.(with Molykote2+ grease)	60112213
GREASE PUMP P203 ARCTIC (with Fuchs Stabyl LT50 grease)	60067070

Part number for Grease pump with main manifold and hoses

(does not include blade hoses& manifolds)

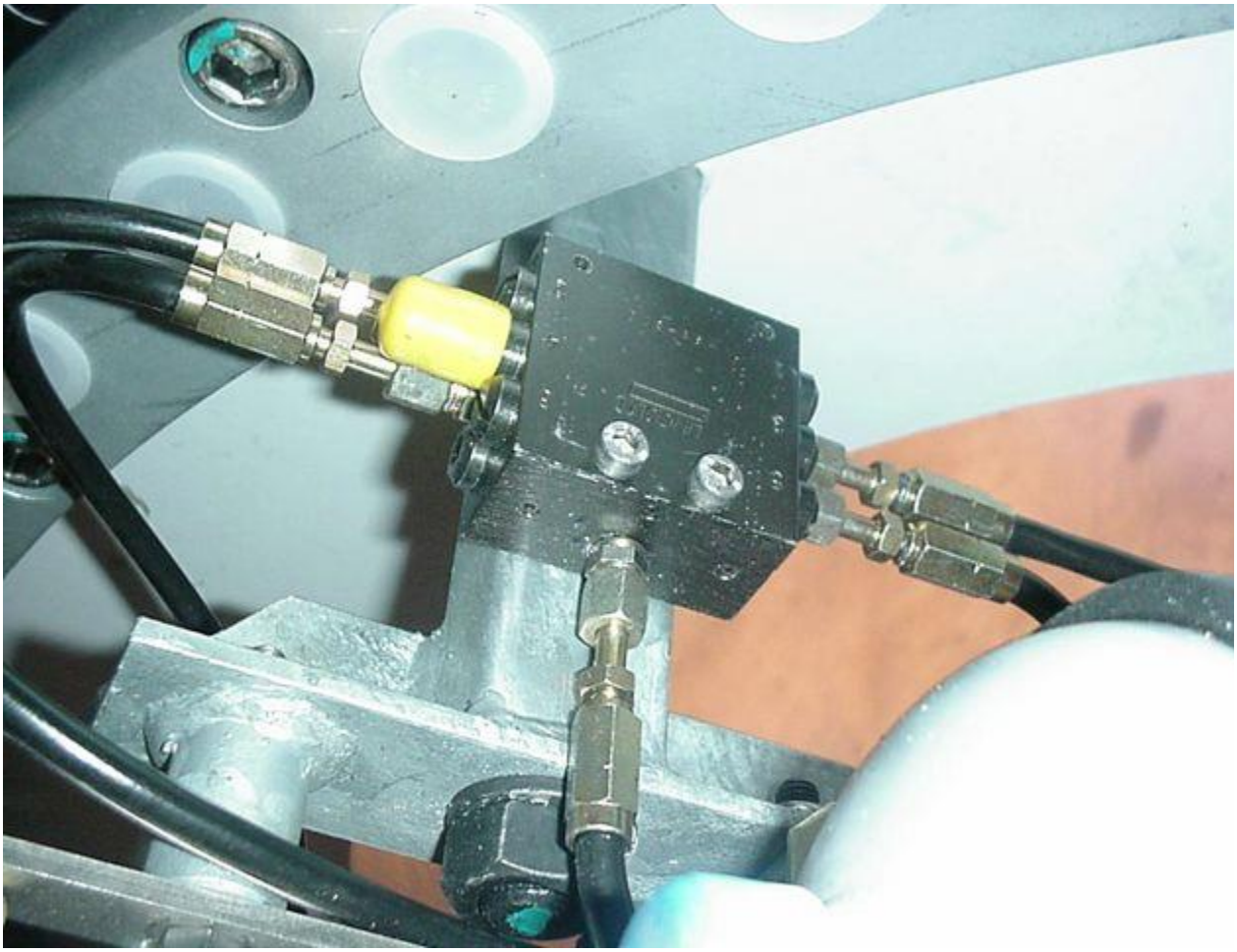
Relevant spare parts	
Description	**Item No.**
PUMP - BRG. GREASING SYS - STD	60073006

Part number for full set of Slave manifolds (3 EA) with hose and accessories:

Relevant spare parts	
Description	**Item No.**
WING PL BRG. GREASING SYS –STD	60094070

Sub - Part number details for hose accessories

COMPONENT	DESCRIPTION	QUANTITY PER	UM	Remarks
60067073	METERING DEVICE "PRIMARY"	1,000	EA	Distributor Manifold
60080996	GREASE HOSE ASSEMBLY (1210 MM.	1,000	EA	Hoses from pump to Distributor manifold to Slav Manifold
60080997	GREASE HOSE ASSEMBLY (390MM)	2,000	EA	
60080998	GREASE HOSE ASSEMBLY (7840 MM.	2,000	EA	
60080999	GREASE HOSE ASSEMBLY (6290 MM.	1,000	EA	
60111921	Protective hood /m.strop red	1,000	EA	Fittings& Accessories for above hose&Manifold
60111922	Elbow LL6MMx1/8K	1,000	EA	
60112211	Check valve ⅂6, high pressure	4,000	EA	
60112212	Protective cap f. quick fittin	4,000	EA	
60067074	METERING DEVICE "SECONDARY"	1,000	EA	Slave Manifold (for 1 blade
60067085	HOSE ⅂6 x 320MM (CUT LENGTH)	1,000	EA	Hoses from Slave manifol to Blade bearing (for 1 blade)
60067086	HOSE ⅂6 x 490MM (CUT LENGTH) S	1,000	EA	
60067087	HOSE ⅂6 x 1200MM (CUT LENGTH)	1,000	EA	
60067088	HOSE ⅂6 x 1380MM (CUT LENGTH)	1,000	EA	
60067089	HOSE ⅂6 x 2080MM (CUT LENGTH)	1,000	EA	
60067090	HOSE ⅂6 x 2250MM (CUT LENGTH)	1,000	EA	
60112212	Protective cap f. quick fittin	6,000	EA	Fittings& Accessories for above hose&Manifold (for
60112214	Quick fittings 90 elbow ⅂6	6,000	EA	

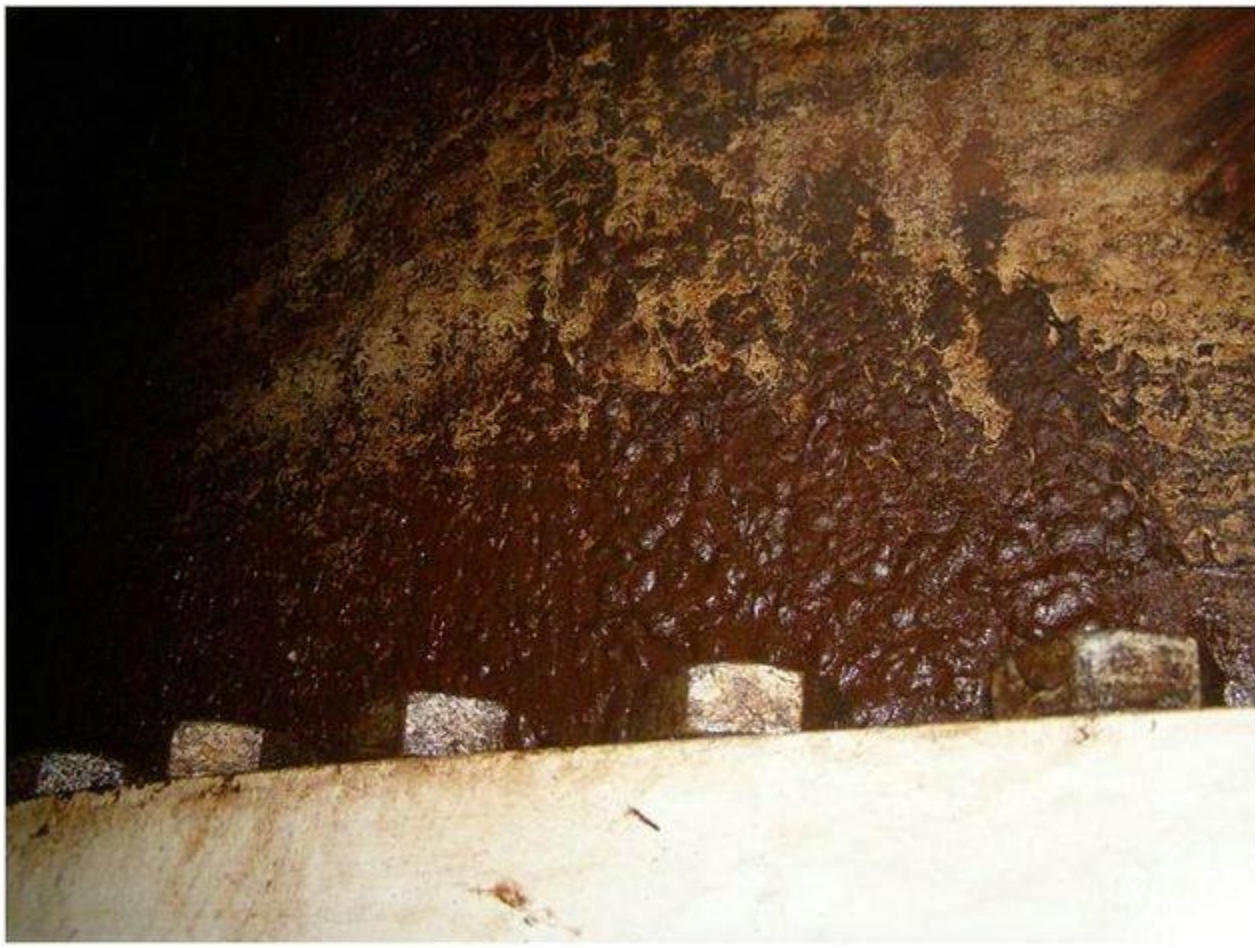


Check for blade bearing grease leaks:

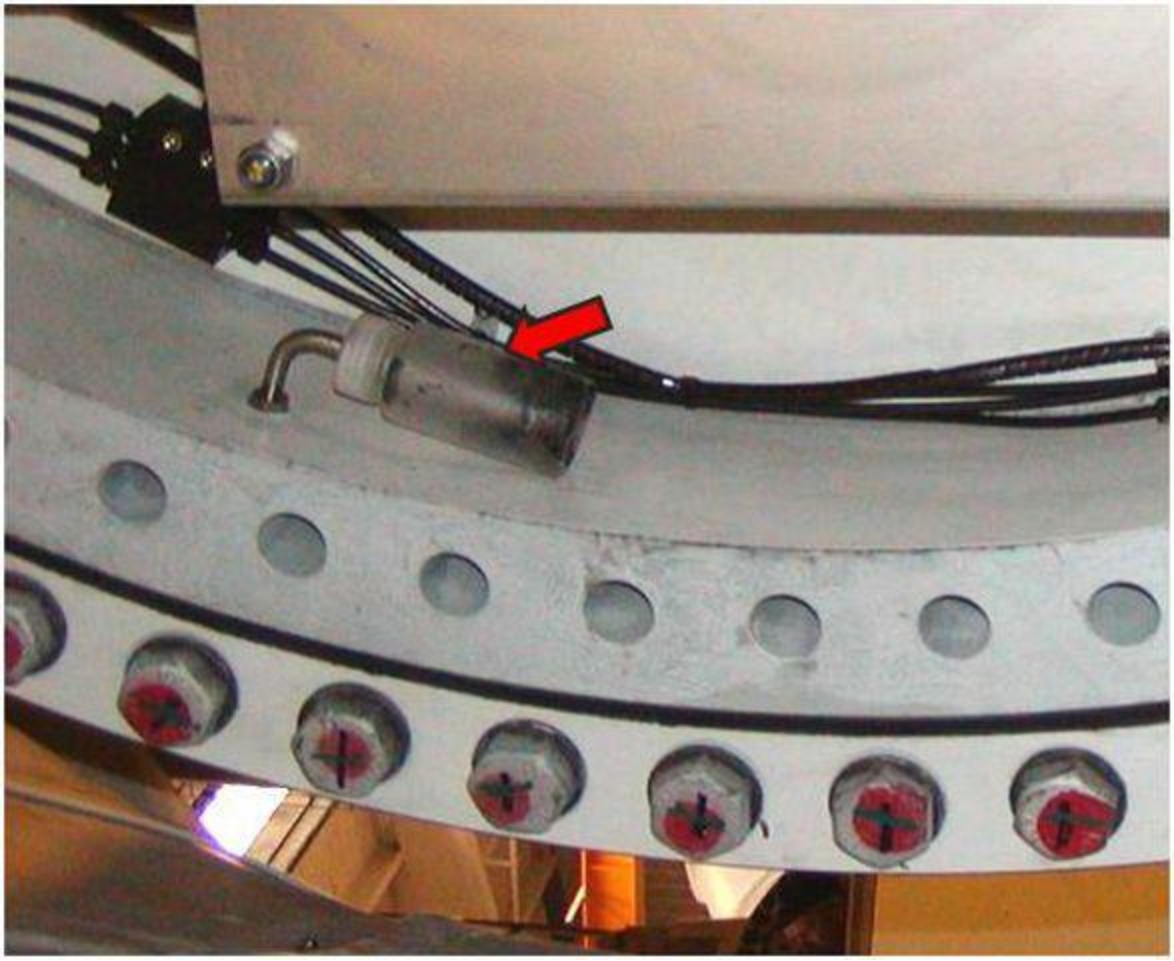
Check blade bearings for any grease leak.

Check the hydraulic system for any leaks, isolate and repair any leaks that are found.

Check for grease or oil stains on the blades and spinner.



Check the grease collector bottles in all blade roots. If there is a large volume of oil in the hub or evidence that oil has penetrated into the bearing, perform a manual greasing operation on all of the blades.



Blade Bearing Manual Grease Procedure

Check the inner and outer blade bearing seals.

If there is any damage or heavy grease leak replace the seals.

Relevant documentation	
Description	**DMS No.**
Blade Bearing Manual Grease Procedure	0024-9719
Installation of IMO Retrofit Inner Blade Bearing Seal	0002-2266
Replacement of Outer IMO Blade Bearing Seal	0003-1177

Replace the defective Hub Computer

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**
  IN THE HUB:

  If after the blade calibration, pitch angles deviate, or angle values show constant when pitching the blades, the hub computer may be defective.

Hub Computer

Relevant spare parts	
Description	**Item No.**
SIF HUB COMPUTER CABINET EVOII	51701801

Relevant CIM case		
CIM case	**Task list**	**SWI**
1594		

Check for surge protector upgrade in power net per below Doc

Relevant documentation	
Description	**DMS No.**
0013-3681_Test Proj_Adnl Elec Prot_V82	0013-3681
Add_Elec_Protec_V82	0033-3872

Check the accumulator pre-charge pressure and recharge the accumulators

Does this solve the problem?

1] Yes

2] No

3] I don't know

- **Explanation**
  IN THE HUB:

Check all of the pitch accumulator pre-charge pressures.

If any of the nitrogen pressures in the accumulators are low, recharge.

Charging of Nitrogen Accumulators

Relevant documentation	
Description	**DMS No.**
Charging of Nitrogen Accumulators	941918

If the bladder in the accumulator has failed, replace the accumulator.

Relevant spare parts

Description	Item No.
HYDR ACCU 20 L 115 BAR DUAL (NM72)	60113096
HYDR ACCU 24.5 L 115 BAR DUAL (V82 other than Australia)	60113097
HYDR ACCU 24.5 L 115 BAR AS1210 (V82 Australia)	60113098

Relevant CIM case		
CIM case	**Task list**	**SWI**
1168		0002-0199

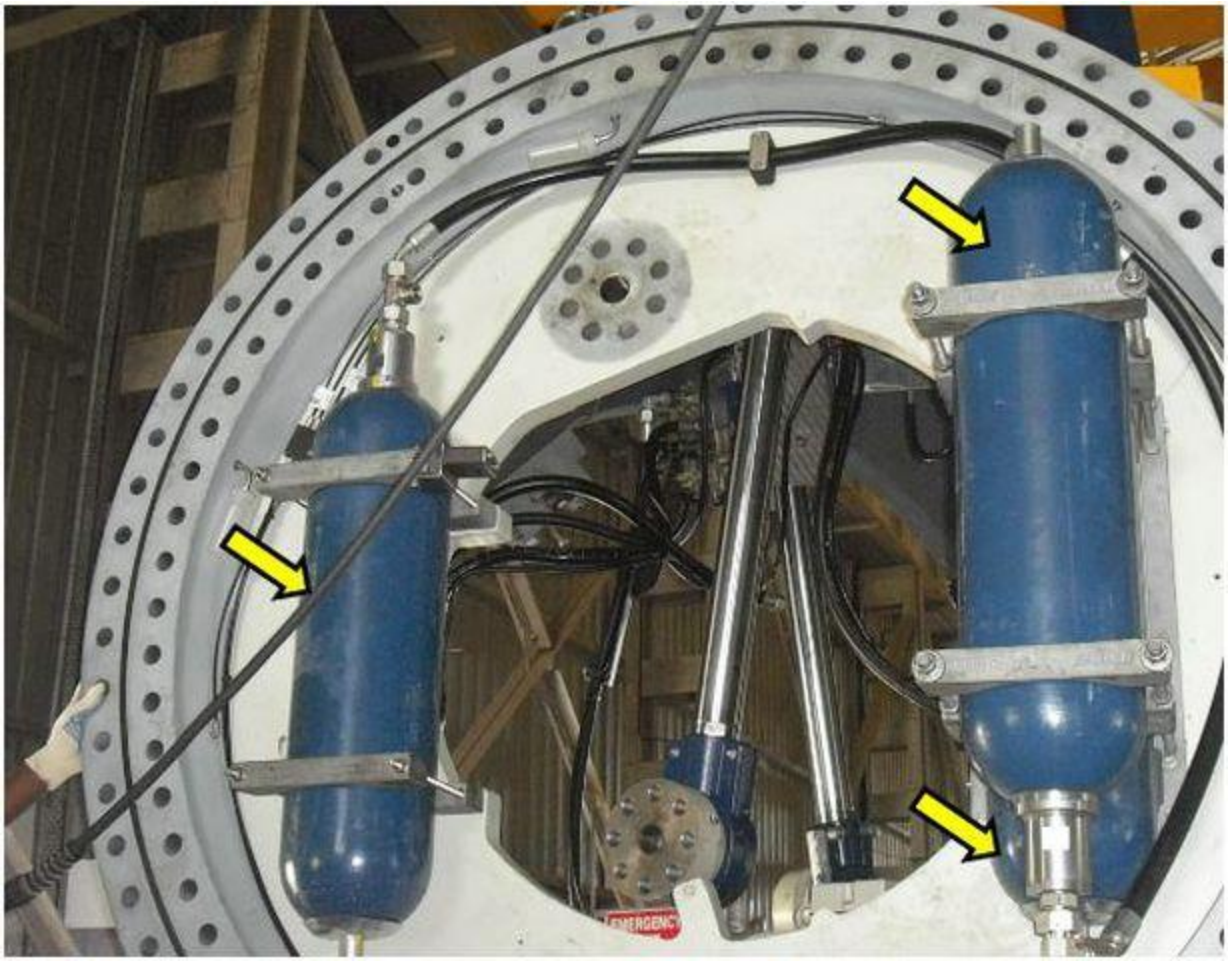
Blade Accumulator Exchange

Relevant documentation	
Description	**DMS No.**
Blade Accumulator Exchange	0001-2871

Check accumulator retrofit installation

Accumulator Retrofit Installation

Relevant documentation	
Description	**DMS No.**
Accumulator Retrofit Installation	0000-9402



Replace the defective proportional valve and cables

Does this solve the problem?

1] Yes

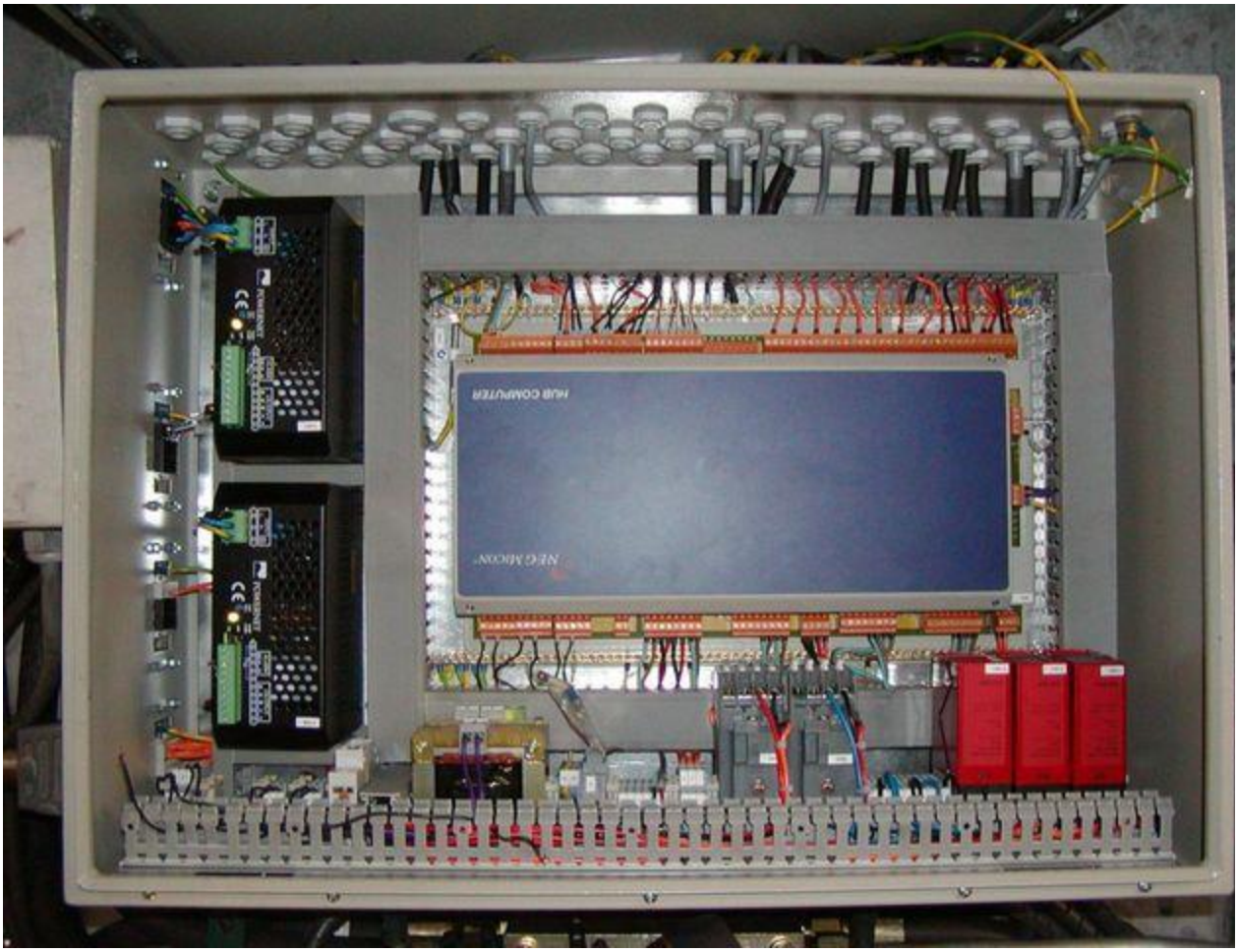
2] No

3] I don't know

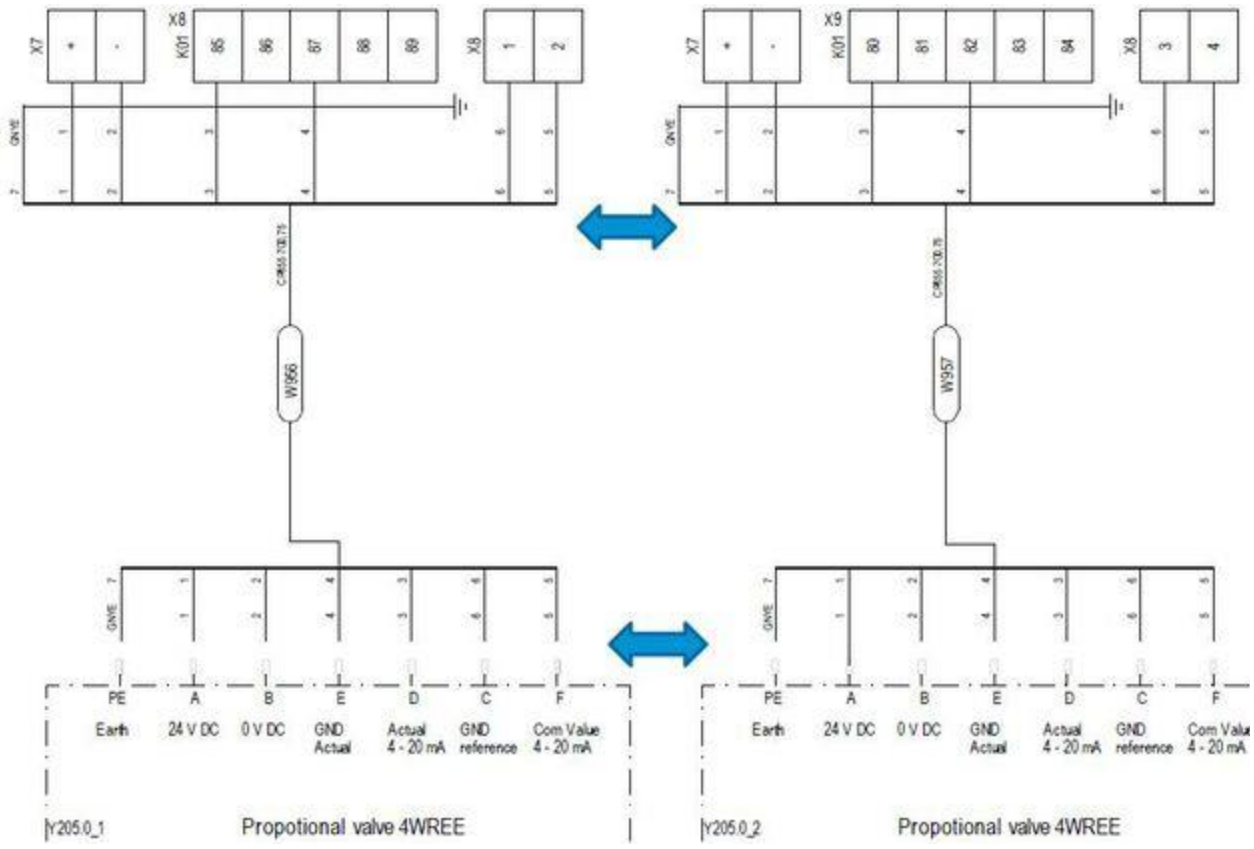
- **Explanation**
  IN THE HUB:

  First swap the signal wire to the proportional valve on the hub computer.

  If the fault follows to the new blade then the fault is either in the proportional valve or one of the cables.



In the example below, we are swapping the plugs between blades A and B.



Place the cables back to their original position and then swap proportional valve from affected blade to another working blade.

If the alarm follows the valve to the other blade, the proportional valve is defective.

If it does not, the proportional valve is likely not the cause.

For Parker proportional valves check to see the color of the LED on the valve circuit board.

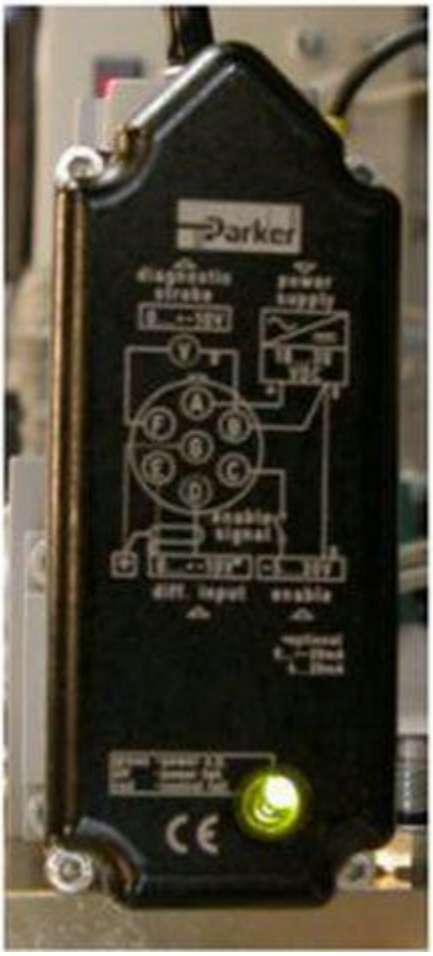
Parker hydraulics SWI below

Relevant documentation	
Description	**DMS No.**

V82 Hydraulic pitch control system	0001-3199

The LED should be green with the pitch system pressurized.

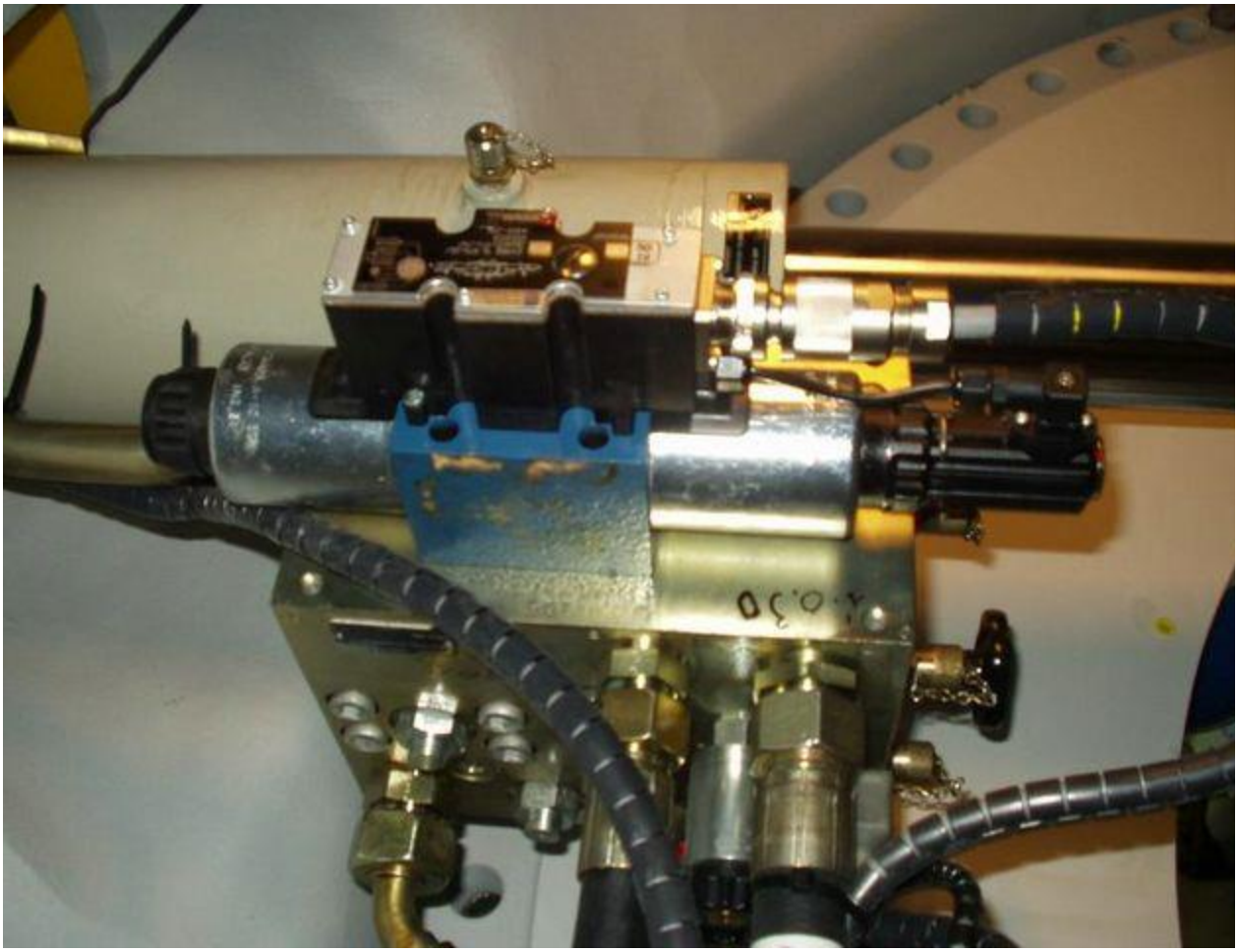
If it is red and there is pressure verified on test port MP, then the valve may also be defective.



Display Color	Indicates
Green	Normal operation
Off	Supply voltage outside permissible range of 18 to 30 VDC
Red	Spool position error / Low pilot pressure

Replace proportional valve using **below SWI**

Relevant documentation	
Description	**DMS No.**
Proportional Valve Replacement	0016-1690



Parker Proportional Valve

Relevant spare parts	
Description	**Item No.**
PROP. VALVE D31FHE01C	60112621

Relevant CIM case		
CIM case	**Task list**	**SWI**
2303	14333	

Rexroth Proportional Valve

Relevant CIM case		
CIM case	**Task list**	**SWI**
1914	14334	

Relevant spare parts	
Description	**Item No.**
PROP VAL 4WREE 10R75-2X/G24K31	60078979

Part number for Proportional valve Cable

Relevant spare parts	
Description	**Item No.**
Cable W 957 Proportional valve Y0205.0-2	60021545

Part number for Valve cables:

Relevant spare parts	
Description	**Item No.**
Cable W 944 Parking valve Y 210.0-2	60021536
Cable W 945 Shutdown valve Y215.O-2	60021537

Change of Valve in Parker Pitch Manifold

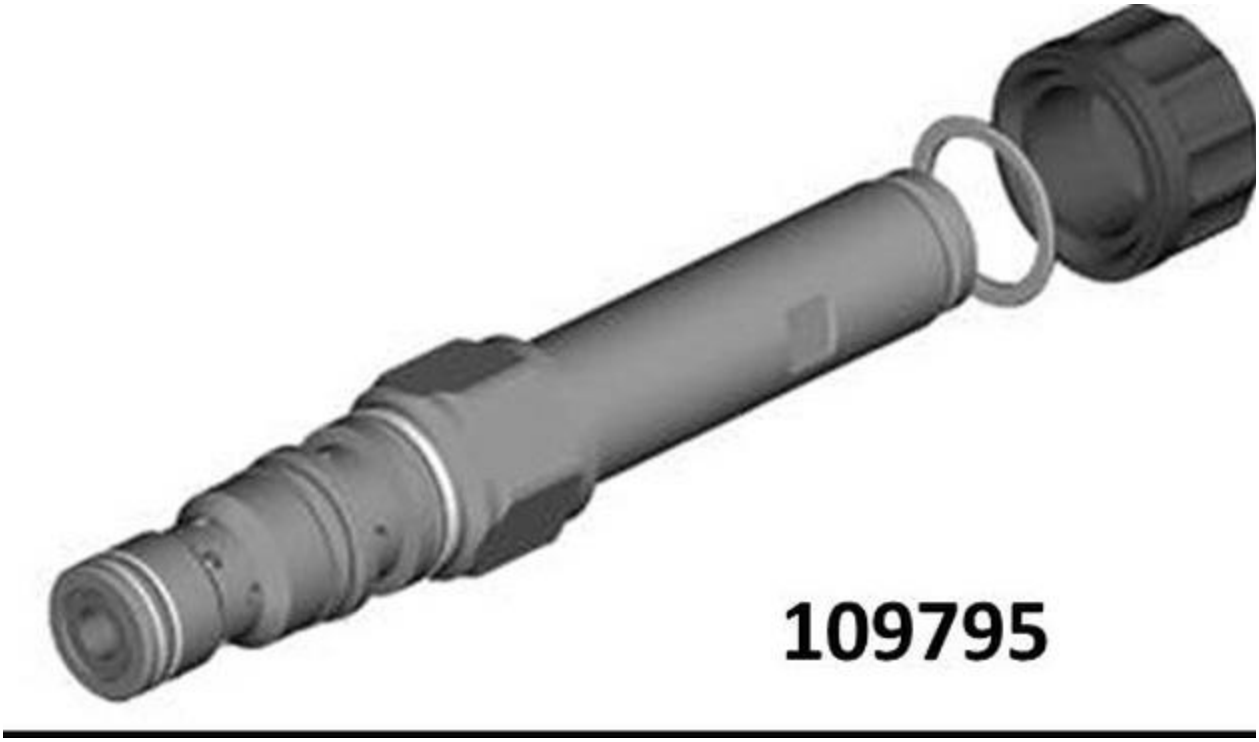
Relevant documentation	
Description	**DMS No.**
Change of valve in Parker pitch manifold	0002-4365

Swap POS. 215 Solenoid valve with one from another blade.

If the valve operates normally, replace the original faulty valve.

Part Number for Solenoid Valve

The part No.60096475 is phased out and henceforth replaced by 109795 & 60106201.



(Rexroth) Valve/Solenoid- 215

Relevant spare parts		
Description	**Item No.**	**Status**
SOL VAL KSDEU1CA/HCG24N0K4M	60096475	Phased out
ELECTRIC SEAT VALVE	109795	Available
COIL GZ37-4 24VDC 19W	60106201	Available

(Parker) 3/2 DIRECTIONAL VALVE

Relevant spare parts	
Description	**Item No.**

3/2 DIRECTIONAL VALVE	60111617

Perform the blade bearing operation

Does this solve the problem?

1] Yes

2] No

3] I don't know

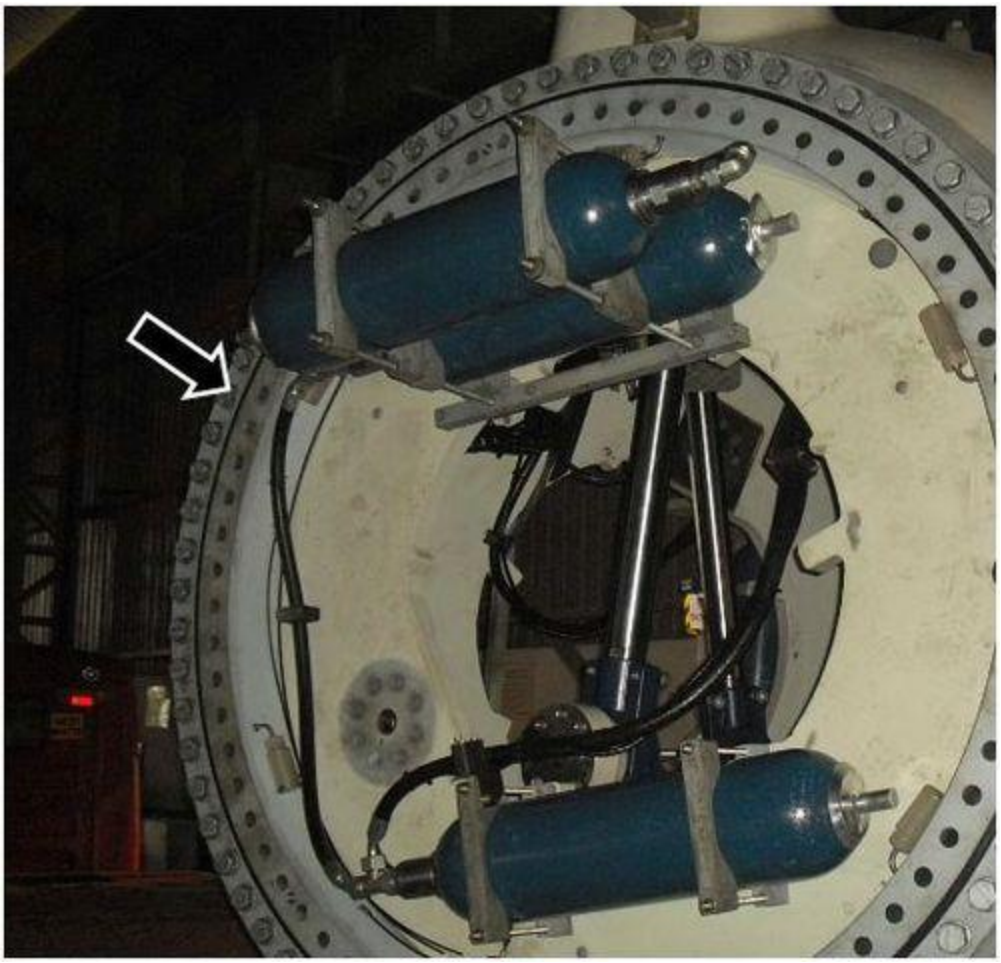
- **Explanation**
  IN THE HUB:

Check the Blade bearing operation 'Pitching to run' and 'Pitching to stop'.

Check for any blade vibration or any abnormal noise during operation.

Perform the Blade Pitch System Test

Relevant documentation	
Description	**DMS No.**
WI - Blade Pitch System Test	0002-0467



If manual greasing does not solve the issue, likely it is the cause of blade bearing failure. Consult the SBU Engineering group to determine course of action and correct item number for the applicable blade bearing.

CIM 1908**:** Pitch bearing_IMO_NM_Bearing seal leakage

CIM 929**:** Pitch bearing_RE (IMO)_NM_Bearing sealing is leaking

Relevant CIM case		
CIM case	**Task list**	**SWI**
1908	16781,16782	
929	16781,16782	

Part number for Blade bearing:

Relevant spare parts	
Description	**Item No.**
BLADE BEAR. STD. IMO -NEW SEAL	60113392
BLADE BEARING STD LAULAGUN	60104445