

	Doc or ECO #:	ECO-71968-002	Date:	6/28/19	Author:	JK
	Rev. #:	A				
Engineering Change Order (ECO)	Engineering Approval:	aeg	Date:	07/19/19	Quality Approval	DO

P/N #:	71968	Effective Date:	June 28, 2019
Title:	Pro 4 Direct Drive Vertical Thruster Update		

1.0 Purpose / Summary

This ECO captures the update of the Brushless Pro 4 Vertical Thruster Motor Shaft **[71880]** which was shortened as a precaution for cartridge seal assemblies **[CS-KIT-BL]** which can pop up when used in low pressure at high temperature. The shortened shaft prevents the immediate flooding of the sub under these conditions.

In addition, a wave washer was added to reduce the audible noise from the motors.

2.0 Parts Affected

Part Number	Notes	Removed	Added	Modified	REV
71880	Update Overall Length, Update Plunge Ground Length	☐	☐	☒	B
71968	Update Motor Shaft Length	☐	☐	☒	B
72137	Add to Assembly	☐	☒	☐	A

3.0 Detail

In the initial release of Thruster Assembly Vertical Direct Drive Brushless (Pro 4) [71968] the shaft length was set higher than the geared motor, a clearance of .060-.136" was selected to increase tolerance for snagging debris like fishline. During the factory tank testing of an ROV with the new Thruster Assembly Vertical Direct Drive Brushless (Pro 4) [71968] the Cartridge Seal Assembly [CS-KIT-BL] popped up and the ROV flooded.

The Cartridge Seal Assembly [CS-KIT-BL] has since been revised to improve retention, this revision provides additional protection in the event the cartridge seal assembly pops by reducing the clearance to .022-.098.

During the QA inspection of the completed vertical motor assemblies it was noted that some motors produced a lot of audible noise, this was tested and found to be the result of pulses from the motor controller resonating in the rotor. A wave washer was added which preloads the bearings and helps to dampen the vibration reducing the audible noise.

4.0 Disposition of Material

All Rev A Thruster Assembly Vertical Direct Drive Brushless (Pro 4) **[71968]** must be reworked to Rev B standards.

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Geared motors using reworked gear boxes should be replaced. These may not be easily identifiable but were produced between 03/2019 and 06/2019.

Older geared thrusters should be replaced in repairs if they exhibit excessive noise or play in the shaft.

It is engineering's recommendation that when in doubt replace with this latest revision of thruster.

5.0 Action Items

Action	Department	Acknowledgement Initials
Transfer all inventory of 71968 Rev A to Quarantine	Inventory Control	SL
Update Epicor	Engineering	RN
Update Vertical Thruster QC inspection	Quality Assurance	DO
Provide PPI with all required information	Purchasing	NS

6.0 Modified / Referenced Documents:

Document	Current Revision
WI-71968	A

7.0 Revision History

Date Revised (mm-dd-yyyy)	Location of Change (section, paragraph no., step no., etc.)	Description of Change Made	Name of Person making the Change
7/19/2019	-	Initial Release	AEG

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