

	Doc or ECO #:	ECO-71071-005	Date:	7/25/19	Author:	aeg
	Rev. #:	A				
Engineering Change Order (ECO)	Engineering Approval:	aeg	Date:	7/25/19	Quality Approval	DO

P/N #:	71071	Effective Date:	July 26, 2019
Title:	Pro4 Computer Build Software Updates for Tether Voltage Calibration		

1.0 Purpose / Summary

Inaccurate tether voltage measurements and tighter tolerancing on the topside DC/DC power converters were causing boardsets and ROV to be flagged as bad in production. The failure symptoms were the ROV resetting on max power tests (thrusting against the side of the tank).

Firmware and tooling to calibrate the voltage reading was developed.

The “turbo” control sensitivity settings were also modified.

All modifications for this ECO are solely software and configuration file changes.

2.0 Parts Affected

Part Number	Notes	Removed	Added	Modified	REV
71071	Update the build for new firmware and config file modifications.	☐	☐	☒	C

3.0 Detail

The ADC converter and voltage sensor on the PRO4 used hardcoded ADC to voltage transform coefficients. This gave inadequate accuracy on recent board sets. Typically, the voltage would read high. This erroneous high voltage reading would cause the PRO4 power manager to fail to engage. This would cause shutdowns of the ROV subside 12V dc/dc converter especially on Ultra systems where the launch voltage is just 48V.

PRO4 firmware was modified to allow for single temperature linear calibration of the tether voltage conversion. Topside software tooling and work instructions [WI-PRO4-SUB-CPU19-Tether Voltage Calibration-001] were developed.

This firmware is backwards compatible and will function the same as current production version if calibration has not been performed.

Additionally, tolerancing of the max current limits on the BCM power converters used on the ICB appear to have tightened with new revisions. Previously systems could exceed the max current draw and the BCMs would not shut down in overcurrent mode till well over the max rating. Current BCMs will trip.

	Doc or ECO #:	ECO-71071-005	Date:	7/25/19	Author:	aeg
	Rev. #:	A				
Engineering Change Order (ECO)	Engineering Approval:	aeg	Date:	7/25/19	Quality Approval	DO

This causes a complete shutdown of the ROV. This would cause failures in production testing when ROV were set to turbo mode and driven hard.

The settings for turbo mode control sensitivity were changed to

90
100
100
100

Specific modifications were:

- Update pro4 firmware to version 2.8.3 (**pro4_2.8.3.hex**)
- Update control sensitivity instrument file with modified turbo settings (**ROV1.Control Sensitivity**)
- Update cockpit installer with the above changes 3_0_173 (**Setup_vrCockpit_3_0_173.msi**)

4.0 Disposition of Material

All PRO4 ROV and boardsets moving forward should be calibrated.

No mandatory rework is required.

Rework of refub, repairs, and loner systems is at the discretion of operations.

5.0 Action Items

Action	Department	Acknowledgement Initials
Update work instructions	Engineering	aeg
Deploy and train production and QA staff on procedures	Engineering	SL
Update any existing flash driving containing 7.00.003 to the current build 7.00.04	Support	BT
Modify PRO4 QC docs as needed	QC	DO

	Doc or ECO #:	ECO-71071-005	Date:	7/25/19	Author:	aeg
	Rev. #:	A				
Engineering Change Order (ECO)	Engineering Approval:	aeg	Date:	7/25/19	Quality Approval	DO

6.0 Modified / Referenced Documents:

Document	Current Revision
WI-71071	E
WI-PRO4-SUB-CPU19-Tether Voltage Calibration-001	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
7/26/2019	Initial Release	Initial Release	aeg