**Impact Analysis**

**Product/Project:** Intellitrol Version 1.7.0 Firmware

**ECR #:**

**Analysis Date:** 11-November-2019

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**Problem Description or other Reason for Change:**

Support for the Super TIM was needed.

There is currently no method of determining the firmware revision of an Intellitrol unit without requesting over Modbus.

Created modbus command 5B to calculate number of connected probes and return the

amount.

When a 2-wire probe has been dry and then opens or shorts the probe status is always reported as being wet.

The default open time for the active dead man switch is 3 seconds, it should be 1 second.

By default, domeout logging in the event log is disabled.

Updated function to calculate number of connected probes to be more accurate in worst

case situations.

Green permit bar will flash for one second when bypass key is successfully added. This

restores functionality as described in current manual.

The first three changes are feature enhancements and the others are bug fixes / behavior changes.

**Root cause of Problems:**

Super TIM is a new product.

There was too much confusion about which version was installed on a customer’s Intellitrol.

If an Intellitrol reported an incorrect compartment count, the user had to disconnect and reconnect the truck to test the number of compartments again.

For the 2-wire probe reporting the routine check\_shorts\_opens was only called if the probe had not been dry. We now call it anytime we have detected the probe is wet to determine if it is truly wet or we are seeing a short or open.

Service requested the change for the active dead man open time change.

For the domeout logging the vriable disable\_domeout\_logging was explicitly set to TRUE in the software start up. No one seems to know why it is set this way. The consensus among service, sales and marketing is that the logging should be enabled.

Users were experiencing issues with the compartment count. The reported compartment count was not very accurate in worst case situations with dirty socket connections.

The green permit bar had originally flashed green when a bypass key was added. The code to flash the LED bar no longer worked and required a rewrite.

**Description of Proposed Changes:**

New features were added for support of the super TIM.

Modbus commands and holding registers were added to the Modbus protocol to allow the TAS to read and write the super TIM parameters. Some registers are read only. Any attempt to write a read only register will get a read only register Modbus fault.

On truck connection the load time, Intellitrol SN and firmware versions are written to the TIM memory for load configured Intellitrols. For unload Intellitrols the unload time and SN are written to the TIM memory.

The 5B Modbus command allows the Intellitrol to retest the number of connected probes and will report it back to the user without the user having to disconnect and reconnect the truck.

New VIP features were added to allow the Intellitrol to not permit based on certificate expiration, compartment / probe count mismatch and expired unload time. All these conditions are bypassable.

The Intellitrol can be configured for unload mode where it will not permit an unload if the expiration time has elapsed since the load time.

The firmware will be changed to display the firmware version number on power up. On startup the firmware revision will be displayed using the compartment and VIP leds. After the leds on the front panel are cycled the firmware version will be displayed using the compartment leds to indicate the value and the VIP leds to indicate what portion of the version is being displayed. For version 1.7.0 the system will light the VIP Authorized led and compartment 1 led. It will then light the VIP Unauthorized led and led 7. The VIP Standby will then light and no compartment number lights will turn on. Displaying the firmware revision adds approximately 10 seconds to the Intellitrol start up time.

To fix the 2-wire probe reporting issue the check\_shorts\_opens routine is always called when a non-pulsing probe is detected.

At the request of service, the active dead man open time was changed to 1 second. As this is an eeprom value currently installed systems will not be affected.

The variable disable\_domeout\_logging will be set to FALSE on start up to allow logging.

The compartment count now uses the lowest voltage instead of live voltage. This greatly helps reduce inconsistencies. The ADC table was also updated to better reflect real life situations.

**Functional Safety Impact of changes:**

- Super TIM support: no impact, this introduces new feature to allow more control of the loading but should not impact safety.

- Version number display: no impact, the unit will display the version number before Dynacheck becomes active so no relays will be on and the unit will be nonpermissive during the 10 seconds of version display time.

- 2 Wire probe reporting: no impact, this only changes the probe status reported and does not affect the way the non-pulsing probe is detected or delay the relay switching.

- Dead man open time default: no impact, this only changes the default time for the active dead man not the behavior.

- Disable domeout logging: no impact, this only changes data loging for domeout events.

- Compartment count: no impact, the compartment count is not a safety system. This change increases accuracy.

**Non-Functional Safety Impacts of changes -**

**Manufacturing:**  There will be no impact on manufacturing with this release. They will follow the same procedure as they do for all Intellitrols.

**Sales/Marketing:** Sales/Marketing will need to update the IFU to include information on the new Modbus registers and VIP features.

**Customer:** With the updated IFU the customer will be able to configure the new features.

**Service:** With the addition of the version number display service will be able to determine the version number of a field unit with the updated firmware.

**Required Document Changes:** The Scully Technical Modbus manual and Modbus User Manual have been updated to reflect changes added in 1.7.0 and the new SuperTIM commands.

**Required Verification and Validation of Change:** Functional ATP 1.5 (completed).