**Impact Analysis**

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

**ECR #:**

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

1. New SuperTIM Features - Support for the Super TIM was needed.
2. Firmware Version Reporting - Method of determining FW version was confusing – Configuration Management records FW releases in decimal topology, but ASCII dump of FW was expressed in Hex and front panel display is expressed in binary.
3. 5-Wire Sensor Count a – Sensor counting only reported on initial connection. Users requested ability to query sensor count after initial connection.
4. 5-Wire Sensor Count b – Sensor count inaccurate in some situations.
5. 2-wire sensor status - When a 2-wire sensor has been dry and then opens or shorts the sensor status is always reported as being wet.
6. Deadman open switch delay – Customers request delay be defaulted to 1 second. This is a customer-configurable setting, but the vast majority of customer prefer a 1 second default.
7. Domeout Logging - (aka overfill logging) domeout logging in the event log is disabled by default. Customers requested this to be enabled.
8. Bypass confirmation – User manual states green permit bar will flash for one second when bypass key is successfully added. This was not happening.

**Root cause of Problems:**

1. New SuperTIM Features - Support for the Super TIM was needed.
2. Firmware Version Reporting – lack of coherent philosophy during feature implementations.
3. 5-Wire Sensor Count a – Compartment count is a state machine routine only called during diagnostic state upon initial connection.
4. 5-Wire Sensor Count b – Compartment count threshold tables set for midrange values based on theoretical ideal connections and component values. These values are compared to an averaged value which can vary significantly due to dirty socket connections. As the value being analyzed is inversely proportional to the number of sensors, additional resistance due to corrosion dirty on the truck socket could push the reported value past a threshold which would indicate a compartment count lower than expected.
5. 2-wire sensor status – Any non-dry condition after a dry state is treated as a generic failure, and the sensor diagnostic routine is not called.
6. Deadman open switch delay – Was set from 1 second to 3 seconds default when Active Deadman was released (ECO 3286).
7. Domeout Logging - Event log was initially developed to log only diagnostic failures.
8. Bypass confirmation – At some point this feature was disabled for unknown reasons.

**Description of Proposed Changes:**

1. New SuperTIM Features:

* Add Modbus commands and holding registers to the Modbus protocol to allow the TAS to read and write the super TIM parameters.
* Write load/unload time stamp to SuperTIM from Intellitrol upon connection.
* Deny permit if certificate dates are expired, or probe counts mismatch, or unloading time limit expired. All these conditions are bypassable.

1. Firmware Version Reporting – Change configuration management topology to track FW version in octal counting scheme because front panel of Intellitrol is limited to 8 compartments.
2. 5-Wire Sensor Count a – Implement new Modbus command (5B) to invoke compartment count routine on demand and report this value back as a response via Modbus (no effect on display).
3. 5-Wire Sensor Count b – Instead of averaging several samples, take the lowest value. Compare this to a new threshold table that has been modified so that ideal values are just above the low threshold for that compartment count equivalent.
4. 2-wire sensor status – Call sensor diagnostic routine (check\_shorts\_open) anytime a failed sensor is detected.
5. Deadman open switch delay – Set default to one second. This number is a customer-configurable setting that is stored in EEPROM. Field upgrades do not overwrite customer configured parameters, so there will be no effect on field upgrades.
6. Domeout Logging - Enable domeout logging in event log by changing the disable\_domeout\_logging variable from TRUE to FALSE.
7. Bypass confirmation – Set instruction in bypass key add routine to flash permit bar when complete.

**Functional Safety Impact of changes:**

1. New SuperTIM Features – No Impact: SuperTIM features are not linked to the safety function of the product.
2. Firmware Version Reporting – No Impact: only performed during a system reset and is a separate function from POD.
3. 5-Wire Sensor Count a – No Impact: Compartment counting not a Safety Function.
4. 5-Wire Sensor Count b – No Impact: Compartment counting not a Safety Function.
5. 2-wire sensor status – No Impact: The safety function disables outputs under any condition considered to be a sensor failure. The function merely reports the \_type\_ of failure.
6. Deadman open switch delay – No Impact: Deadman not a Safety Function.
7. Domeout Logging - No Impact: this feature records failures in a data log and does not affect the safety function.
8. Bypass confirmation – No Impact: This function is only performed when the system is offline.

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

**Manufacturing:**  None

**Sales/Marketing:** Personnel should be trained on the new SuperTIM features as well as the behavioural changes.

**Customer:** None, other than the ability to used new Modus and SuperTIM features

**Service:** Same as Sales/Marketing

**Required Document Changes:** The Scully Technical Modbus manual and Modbus User Manual must be 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).